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CHAPTER 1

THE WONDERFUL WORLD OF SCIENCE

SUMMARY

1. INTRODUCTION TO SCIENCE

Science is a special way we can learn about the world around us and even the entire universe. It's like a big adventure where we ask many questions, explore different things, and try to figure out how everything works. The most important thing needed for science is curiosity, which means always wanting to know more. Whether we are looking at tiny things like sand or huge things like mountains and forests, there's always something new and exciting to discover. Science is all around us, from deep oceans to outer space, and even in our kitchens and playgrounds.

2. SCIENCE AS A PUZZLE

Think of science as a giant puzzle that never ends. Every time we discover something new, we add another piece to this puzzle. The exciting part is that each new piece of information leads to more questions and more things to find out. Sometimes, we learn that an old idea was not quite right, and new discoveries help us understand the world better.

3. WHAT WE WILL EXPLORE

In this science book, we will start by learning about our planet, Earth. Earth is a special place because it's the only planet we know where life exists, so we must take care of its environment. We see many kinds of plants and animals living in different parts of the Earth. We will explore how plants and animals grow, like how a seed becomes a plant or a caterpillar turns into a butterfly.

To grow, all living things need food. India has so many different types of tasty food, and we will find out what these foods are made of. We also need water to live. We will learn about water, why it rains, how water can turn into ice when it's cold and steam when it's hot. We will also understand what makes things hot or cold.

Around us, there are many different materials like paper, metal, plastic, rubber and cloth. We will ask questions about what these things are made of and how we can separate different materials. Our questions won't stop at Earth; we will also wonder about the Sun, Moon, and stars. This book aims to make you curious and ask lots of questions about everything you learn.

4. HOW TO FIND ANSWERS: THE SCIENTIFIC METHOD

We often find s to our questions by using a special method, even if we don't realize it. For example, if your pen stops writing, you first ask, "Why did it stop?" You might guess that the ink is finished. Then, you test this guess by checking the ink refill. If it's not empty, you make another guess, like maybe the ink dried up, and then you try something else to check that. This way of solving problems is called the scientific method.

The scientific method has a few steps. First, we observe something interesting or something we don't understand. This makes us ask a question. Then, we make a guess or a possible answer to our question. After that, we test our guess by doing experiments or making more observations. Finally, we look at the results to see if our guess was correct and if our question is answered.

People who use the scientific method to solve problems or discover new things are called scientists. But anyone can work like a scientist! When a cook wonders why dal spilled from the cooker, or a cycle mechanic tries to find a leak in a flat tyre, or an electrician checks why a bulb isn't working, they are all using a form of the scientific method. When we ask questions and try to find answers, we are all behaving like scientists.

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5. LEARNING SCIENCE TOGETHER

Learning science helps us get better at solving bigger problems and understanding more mysteries. The most important thing for learning science is to be curious, observe things carefully, and keep asking "how" and "why". Science is often done by teams of scientists working together. So, if you can't find an by yourself, it's good to ask your friends for help because discovering things together is more fun. Don't worry if you don't find all the s in Class 6 learning science is a long and exciting journey. The main idea is to enjoy exploring, keep wondering, and always ask questions.

MULTIPLE CHOICE QUESTION

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1. What is science?
   (A) A method of memorizing facts and figures about the universe.
   (B) A process of conducting experiments without any specific questions.
   (C) A way of thinking, observing, and doing things to understand the world.
   (D) A collection of beliefs about how things work.

   Ans :

   (C) A way of thinking, observing, and doing things to understand the world.
   Science is a systematic approach involving curiosity, questioning, exploration, and experimentation to understand the natural world and the universe. It is a dynamic process of discovery rather than a static set of facts.

2. Why is science described as a "giant and unending jigsaw puzzle"?
   (A) Because it is a game that only a few can play.
   (B) Because new discoveries add pieces, leading to more questions.
   (C) Because it has a fixed number of pieces to be discovered.
   (D) Because it is primarily about solving complex mathematical problems.

   Ans :

   (B) Because new discoveries add pieces, leading to more questions.
   Science is likened to an unending jigsaw puzzle because each new finding or discovery provides a piece of understanding, which in turn opens up new questions and areas for further exploration, making the process continuous.

3. What is the scientific method?
   (A) A rigid set of rules that must be followed in a specific order.
   (B) A way to prove pre-existing beliefs about the natural world.
   (C) A step-by-step process of observing, questioning, guessing, and testing.
   (D) A method used exclusively by professional scientists in laboratories.

   Ans :

   (C) A step-by-step process of observing, questioning, guessing, and testing.
   The scientific method is a systematic approach to investigation that involves making observations, formulating questions, making educated guesses (hypotheses), and then testing these guesses through experiments or further observations to arrive at conclusions.

4. A student notices that plants kept in a dark room do not grow well. Using the scientific method, what would be their next logical step after this observation?
   (A) Immediately conclude that all plants need sunlight.
   (B) Ask a question, such as "Does sunlight affect plant growth?"
   (C) Conduct an experiment by giving some plants extra fertilizer.
   (D) Ignore the observation as it might be a coincidence.

   Ans :

   (B) Ask a question, such as "Does sunlight affect plant growth?"
   After making an observation (plants in a dark room not growing well), the next step in the scientific method is to formulate a question based on that observation to guide further investigation.

5. Why is it said that anyone using the scientific method is acting like a scientist?
   (A) Because only professional scientists use the scientific method.
   (B) Because the scientific method is about common sense, which everyone possesses.
   (C) Because everyday problem-solving often involves observing, guessing, and testing.
   (D) Because scientists are the only ones who ask questions about the world.

Ans :

(C) Because everyday problem-solving often involves observing, guessing, and testing.
The basic principles of the scientific method—like observing, asking questions, forming hypotheses, and testing them—are often used in everyday situations, such as finding out why a pen has stopped working or why food spilled from a cooker.

6. How is science different from just memorizing facts?
(A) Memorizing facts is more important in science than the process of discovery.
(B) Science is a dynamic process of inquiry, while memorizing is passive.
(C) True science does not involve any memorization of facts at all.
(D) Memorizing facts is the first step of the scientific method.

Ans :

(B) Science is a dynamic process of inquiry, while memorizing is passive.
Science involves actively thinking, observing, and experimenting to understand how things work, rather than simply memorizing facts and figures.

7. Which of the following is NOT considered a step in the scientific method?
(A) Observing something that is interesting.
(B) Guessing a possible answer to a question.
(C) Accepting a guess without testing it.
(D) Testing a guess through experiments or more observations.

Ans :

(C) Accepting a guess without testing it.
The scientific method involves testing guesses (hypotheses) through experiments or further observations. Accepting a guess without any form of testing goes against the principles of scientific inquiry.

8. Imagine you are trying to figure out why your flashlight isn't working. First, you observe it's not turning on. You guess the batteries might be dead. You then replace the batteries. According to the scientific method described, what is your action of replacing the batteries an example of?
(A) Making an initial observation.
(B) Forming a question.
(C) Testing your guess (hypothesis).
(D) Analyzing the results.

Ans :

(C) Testing your guess (hypothesis).
In this scenario, observing the flashlight not working is the initial observation. Guessing the batteries are dead is forming a hypothesis. The act of replacing the batteries is the step of testing that hypothesis to see if it resolves the problem.

9. What does the idea that "new discoveries often change our understanding of the world" suggest about scientific knowledge?
(A) Scientific knowledge is absolute and never changes.
(B) Scientific knowledge can evolve and be revised based on new evidence.
(C) Old scientific discoveries are always incorrect and should be discarded.
(D) Understanding the world is not possible through science.

Ans :

(B) Scientific knowledge can evolve and be revised based on new evidence.
This statement highlights that science is a progressive field. As new evidence emerges and new discoveries are made, existing scientific understanding can be refined, modified, or even overturned, reflecting the dynamic nature of scientific knowledge.

10. What is a key benefit of working together with friends in science?
(A) It makes experiments less accurate.
(B) It is always more fun to discover things together.
(C) It helps in memorizing facts more easily.
(D) It eliminates the need for individual curiosity.

Ans :

(B) It is always more fun to discover things together.
Collaborative learning in science makes discovery more enjoyable, and reflects how scientists often work together in teams to solve problems and share ideas.

11. What is the term for a guess or a possible answer to a scientific question before it is tested?
(A) A theory
(B) A law
(C) A hypothesis
(D) An observation

Ans :

(C) A hypothesis

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In the scientific method, a hypothesis is an educated guess or a proposed explanation for an observation, which is then tested through experimentation or further observation to determine its validity.

12. What does the phrase "To be a wise person, you must be a 'whys' person!" emphasize about learning science?
(A) Memorizing answers to all "why" questions.
(B) Constantly asking questions and seeking understanding.
(C) Believing everything you are told without questioning.
(D) Avoiding difficult questions in science.

Ans :

(B) Constantly asking questions and seeking understanding.
This phrase encourages a curious and inquisitive mindset, highlighting that the path to wisdom and scientific understanding involves consistently asking "why" and seeking deeper explanations for phenomena observed in the world.

13. If a student observes that a particular type of bird is only seen during winter in their area, what scientific question could arise from this observation?
(A) Are all birds migratory?
(B) Why does this bird species appear only in winter?
(C) What is the bird's favorite food?
(D) How many feathers does this bird have?

Ans :

(B) Why does this bird species appear only in winter?
The observation of a bird appearing seasonally would naturally lead to a question about the reason for this specific pattern, such as investigating its migratory behavior or seasonal adaptations.

14. Where can science be found in our daily lives?
(A) Only in laboratories and research institutions.
(B) Only in textbooks and scientific journals.
(C) Everywhere, from the depths of the ocean to outer space.
(D) Only in complex natural phenomena, not everyday things.

Ans :

(C) Everywhere, from the depths of the ocean to outer space.
The explicitly states that "the most wonderful thing about science is that it is everywhere," encompassing a vast range of scales and environments, from the microscopic to the cosmic, and including everyday occurrences.

15. What does the idea of moving a puzzle piece in science refer to?
(A) The idea that scientific experiments often fail.
(B) The self-correcting nature of science where existing ideas are revised with new evidence.
(C) The fact that scientists often misplace their equipment.
(D) The process of creating new scientific theories from scratch.

Ans :

(B) The self-correcting nature of science where existing ideas are revised with new evidence.
This analogy refers to the way scientific understanding evolves. When new data or better explanations emerge, previously accepted ideas or theories might be re-evaluated and modified, demonstrating science's capacity to correct and refine itself.

16. What is the primary aim of asking questions and exploring the world in science?
(A) To prove personal opinions.
(B) To understand how things work and uncover secrets of the universe.
(C) To create complex technologies immediately.
(D) To find the simplest answers to all questions.

Ans :

(B) To understand how things work and uncover secrets of the universe.
Science is the pursuit of understanding how the world and the universe work, involving exploration, asking questions and discovering the principles of nature..

17. The example of a bicycle repair person trying to find an air leak is used to illustrate:
(A) That only mechanics use the scientific method.
(B) How complex scientific problems are solved.
(C) That everyday problem-solving can involve a scientific approach.
(D) The importance of having the right tools for science.

Ans :

(C) That everyday problem-solving can involve a scientific approach.

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This example, along with others like a cook figuring out why dal spilled, is used to show that the systematic process of questioning, guessing, and testing (the scientific method) is not limited to formal science but is also applied in everyday problem-solving scenarios.

MATCHING TYPE QUESTION

18. Match the aspect of science in Column A with its description in Column B:

	Column A		**Column B**
1.	Science is	A.	Observing something interesting and making a guess about it
2.	Curiosity	B.	A way of thinking and exploring to understand the world
3.	Scientific Method (First steps)	C.	New discoveries can change our previous understanding
4.	Evolving nature of Science	D.	The most important thing for engaging in science

(a) 1-B, 2-D, 3-A, 4-C
(b) 1-D, 2-B, 3-C, 4-A
(c) 1-B, 2-A, 3-D, 4-C
(d) 1-A, 2-D, 3-B, 4-C

Ans :

(a) 1-B, 2-D, 3-A, 4-C
Science is a way of understanding the world. Curiosity is key to science. The scientific method starts with observation and guessing. Science evolves as new discoveries are made.

19. Match the examples of scientific inquiry in Column A with the scientific approach they represent in Column B:

	Column A		**Column B**
1.	Wondering why stars shine	A.	Applying the scientific method in daily life
2.	Pen stops writing, checking ink	B.	Exploring the variety of life on Earth
3.	Observing a caterpillar to butterfly	C.	Asking questions about the universe
4.	Cooker spills dal, checking water level	D.	Testing a guess through observation/ experiment

(a) 1-A, 2-C, 3-D, 4-B
(b) 1-C, 2-D, 3-B, 4-A
(c) 1-C, 2-A, 3-B, 4-D
(d) 1-B, 2-D, 3-A, 4-C

Ans :

(b) 1-C, 2-D, 3-B, 4-A
Wondering about stars is questioning the universe. Checking pen ink is testing a guess. Observing life cycles explores Earth's biodiversity. A cook troubleshooting a spill applies scientific method.

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20. Match the step of the scientific method in Column A with its description in Column B:

	Column A		**Column B**
1.	Observation	A.	Try to see if results answer the initial question
2.	Questioning	B.	Notice something interesting or not understood
3.	Guessing (Hypothesising)	C.	Guessing (Hypothesising)
4.	Analysing Results	D.	Formulate a possible answer or explanation to test

(a) 1-B, 2-C, 3-D, 4-A
(b) 1-C, 2-B, 3-A, 4-D
(c) 1-B, 2-A, 3-D, 4-C
(d) 1-D, 2-C, 3-B, 4-A

Ans :

(a) 1-B, 2-C, 3-D, 4-A
Scientific method begins with an observation, leading to questioning. A guess or hypothesis is then formed, and finally, results from testing that guess are analysed.

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21. Match the broad area of exploration (Column A) with a specific example or question related to it (Column B):

	Column A		Column B
1.	Food	A.	How do plants and animals grow?
2.	Materials Around Us	B.	Why and how does it rain?
3.	Life on Earth	C.	What are different tasty dishes made of?
4.	Water	D.	What are paper, metal, and plastic made of?

(a) 1-D, 2-C, 3-A, 4-B
(b) 1-C, 2-A, 3-B, 4-D
(c) 1-A, 2-D, 3-C, 4-B
(d) 1-C, 2-D, 3-A, 4-B

Ans :

(d) 1-C, 2-D, 3-A, 4-B
Exploring food involves its composition. Materials science questions what things are made of. Life on Earth studies growth. Water exploration includes understanding phenomena like rain.

22. Match the characteristic of science in Column A with its implication in Column B:

	Column A		Column B
1.	Science is everywhere	A.	New knowledge often leads to more questions
2.	Science as a jigsaw puzzle	B.	It can be observed in daily activities, not just labs
3.	Unending nature of discovery	C.	Scientists often work in teams and share findings
4.	Collaborative aspect of science	D.	Every new discovery adds a piece to our understanding

(a) 1-C, 2-A, 3-D, 4-B
(b) 1-B, 2-D, 3-A, 4-C
(c) 1-B, 2-A, 3-D, 4-C
(d) 1-D, 2-C, 3-B, 4-A

Ans :

(b) 1-B, 2-D, 3-A, 4-C
Science being everywhere means it's in daily life. Like a puzzle, new discoveries build understanding. Its unending nature means questions always lead to more. Collaboration is common in scientific work.

VERY SHORT QUESTION

23. What is the new subject introduced for exploring the world in the Middle Stage of school?

Ans :

Science

24. How is science defined?

Ans :

A way of thinking, observing, and doing things to understand the world.

25. What is the most important quality needed for science?

Ans :

Curiosity.

26. What is the title of the Grade 6 Science textbook mentioned?

Ans :

Curiosity.

27. Name one mystery of nature that science helps unravel.

Ans :

Why stars shine.

28. Where can science be found, according to the text?

Ans :

Everywhere.

29. Do new scientific discoveries ever lead to changes in our understanding?

Ans :

Yes

30. Which planet is uniquely known to support life?

Ans :

Earth.

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31. Besides food, what essential substance do we need for survival mentioned in the text?

Ans :

Water.

32. What happens to water when it is cooled sufficiently?

Ans :

It freezes and becomes ice.

33. What is produced when water is heated sufficiently?

Ans :

It boils and becomes steam.

34. What everyday object was used as an example for applying the scientific method when it stops working?

Ans :

A pen.

35. What is the first step in the scientific method after observing something?

Ans :

Wonder and think of a question.

36. What are people called who follow the scientific method to solve problems?

Ans :

Scientists

37. Can a person be considered working like a scientist if they follow the scientific method in daily life?

Ans :

Yes.

38. What is the foremost thing needed to learn science well?

Ans :

To be curious and observe surroundings keenly.

39. When curiosity is sparked, what kinds of questions do we begin to ask?

Ans :

How and why.

40. Is science typically an individual or a team effort?

Ans :

A team effort.

41. What kind of "person" should you be to become a wise person?

Ans :

A "whys" person.

SHORT ANSWER QUESTION

42. Explain the meaning of "Science" .

Ans :

Science is a way of thinking, observing, and doing things to understand our world and uncover the universe's secrets, like a grand adventure of inquiry.

43. Why is the Grade 6 Science textbook titled "Curiosity"?

Ans :

The textbook is titled "Curiosity" because having curiosity is the most important thing needed to explore, ask questions, and understand how things work in science.

44. List two examples of natural phenomena that suggests science helps us understand.

Ans :

Science helps us understand mysteries like why stars shine in the night sky and how a flower knows the precise moment to bloom.

45. What interesting aspect of food in India does the chapter point out?

Ans :

The chapter points out that in a diverse country like India, food is fascinating, with different cuisines and many tasty dishes to explore.

46. What are two questions about water that the chapter encourages readers to think about?

Ans :

The chapter encourages readers to wonder why and how it rains, and to notice how water changes form when cooled or heated.

47. Name three different types of materials mentioned in the chapter that we use.

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Ans :

The chapter mentions materials such as paper we write on, a metal key, a plastic ruler, a rubber eraser, magnets, and clothes.

48. How does the chapter suggest we can expand our scientific inquiry beyond Earth?

Ans :

The chapter suggests expanding our inquiry by asking questions about celestial bodies like the Sun, the Moon, and the millions of stars in the sky.

49. Briefly outline the problem-solving steps described for a pen that stops writing.

Ans :

If a pen stops writing, first guess the ink is finished and test by checking. If ink is present, guess it dried up and test differently.

50. What are the three core actions of the scientific method after an observation and question?

Ans :

After observing and questioning, the core actions are: guess a possible (hypothesis), test this guess through experiments or observations, and analyze the results.

51. Give an example from the chapter of someone applying scientific thinking in a daily task.

Ans :

An example is someone cooking who wonders why dal spilled from the cooker, questioning if too much water was used, thus applying scientific thinking.

52. How does learning science, according to the chapter, improve our problem-solving abilities?

Ans :

Learning science develops our capabilities for finding solutions to bigger problems and solving more universal mysteries by understanding and applying the scientific method effectively.

53. What does the chapter advise if you cannot find an answer to a question on your own?

Ans :

If you cannot find an alone, the chapter advises asking friends for help, as science is often a collaborative effort and discovery is more fun together.

54. How is the journey of learning science portrayed in terms of duration in the chapter?

Ans :

The journey of learning science is portrayed as an ongoing exploration spanning several years, possibly extending beyond school, with continuous discoveries and new questions.

55. What joyful activity is science compared to at the end of the chapter?

Ans :

At the end, science is compared to children joyfully enjoying the rain, emphasizing that science is fundamentally about joyful exploration and continuous wonder.

56. What is the significance of being a “whys” person, as mentioned in the chapter’s conclusion?

Ans :

Being a “whys” person, someone who constantly asks ‘why’, is significant because this inquisitive nature is key to becoming a wise person through scientific exploration.

57. What is the primary aim of the “Curiosity” textbook as suggested by the introductory chapter?

Ans :

The primary aim is to ignite students’ spirit of inquiry, encouraging them to explore their surroundings, ask questions, and understand the world using scientific principles.

58. What examples of natural transformations does the chapter offer that can spark curiosity?

Ans :

The chapter offers transformations like a seed growing into a plant or a caterpillar changing into a beautiful butterfly as observations that can spark curiosity.

LONG ANSWER QUESTION

59. The “Science” not just as a subject but as a “way of thinking.” Elaborate on this idea using details from the text, and explain why ‘Curiosity’ is deemed its most vital component.

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Ans :

Science as a dynamic process of thinking, observing, and acting to comprehend our world and its mysteries. It's an adventure of inquiry, not static knowledge. 'Curiosity' is vital because it's the engine of this process. It's the inherent urge to ask "why" and "how," which fuels observation, questioning, exploration, and ultimately, the joy of discovery. The textbook itself is named "Curiosity" to emphasize its role in fostering this spirit, suggesting that true scientific engagement begins with a curious mind eager to explore and understand.

60. Discuss the analogy "Science is like a giant and unending jigsaw puzzle". How does this comparison explain the nature and progression of scientific knowledge?

Ans :

This analogy effectively portrays science as a vast, complex, and ever-expanding field of knowledge. Each new discovery is like adding a new piece to the puzzle, enhancing our understanding. The "unending" aspect highlights that science is never complete; each often uncovers more questions, leading to continuous investigation. It also implies that scientific knowledge is built progressively and collaboratively. Furthermore, the idea that pieces might be "put in the wrong place" reflects how scientific understanding can evolve, with new evidence correcting or refining previous theories and conclusions.

61. "The most wonderful thing about science is that it is everywhere." Justify this statement with at least four distinct examples provided in the chapter, covering different scales or environments.

Ans :

Science's omnipresence with diverse examples. It's in the vastness of outer space (stars shining), in natural processes (a flower blooming, a seed growing), in our homes (cooking in the kitchen, properties of water), and even in the materials we use daily (paper, plastic, metal). It ranges from studying microscopic grains of sand to massive mountains and from the depths of the ocean to our playgrounds. This pervasiveness shows that scientific principles and inquiry are applicable to understanding all aspects of our existence and environment, not just formal laboratory settings.

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62. Describe the scientific method using the everyday example of a pen that stops writing, as explained in the chapter. What are the general sequential steps involved in this method?

Ans :

When a pen stops writing, the scientific method begins with an observation and a question: "Why did it stop?" Then, a hypothesis is formed, e.g., "the ink finished." This is tested by checking the refill. If the test fails (ink is present), a new hypothesis, like "the ink dried up," is proposed and tested differently.

The general steps are:

1. Observe something interesting or unexplained.
2. Ask a question about it.
3. Formulate a guess or hypothesis.
4. Test the hypothesis through experiments or further observations.
5. Analyze the results to draw a conclusion.

63. How does the chapter encourage students to seek answers to their questions, and what role does collaboration play in the scientific process ?

Ans :

The chapter encourages students to pro-actively seek s by keenly observing, asking "how and why," and applying the scientific method of guessing and testing. It stresses that this isn't just for professional scientists. If an isn't found individually, the text strongly advocates for collaboration, stating, "ask your friends to help you out!" It highlights that science is rarely a solitary pursuit; scientists worldwide work in teams, and discovering things together is portrayed as more effective and enjoyable, reflecting the collaborative nature of scientific advancement.

64. What are some of the broad thematic areas of study hinted at in this introductory chapter that students will likely explore in the "Curiosity" textbook? Mention at least three.

Ans :

Firstly, students will explore Earth, its environment and the diversity of life, including how plants and animals grow. Secondly, they will delve into the science of everyday things, such as food, its composition, and different materials around us like paper, metal, and plastic. Thirdly, fundamental concepts like water and its properties, understanding temperature (hot and cold), and even extending curiosity to celestial

bodies like the Sun, Moon, and stars will be part of their scientific journey.

65. The scientific thinking is not confined to scientists alone but is applied in many daily life situations. Explain this with two distinct examples given in the text.

Ans :

A person cooking who wonders why dal spilled from the cooker, hypothesizing if there was too much water. This mirrors scientific questioning. Another example is a bicycle repair person trying to locate an air leak in a flat tyre, or an electrician determining why a bulb isn't working by checking the bulb or switch. In both scenarios, individuals observe a problem, form a guess about the cause, and then investigate or test their guess, which is the essence of applying the scientific method in everyday problem-solving.

66. Explain the chapter's concluding message: "to be a wise person, you must be a 'whys' person!" What does this emphasize about learning and the scientific mindset?

Ans :

This concluding message powerfully emphasizes that wisdom is cultivated through persistent inquiry and a relentless desire to understand the underlying reasons for things – by constantly asking "why?" In the context of science, it reinforces that learning is an active process driven by curiosity, not passive memorization. Being a "whys" person signifies a commitment to questioning, investigating, and seeking explanations, which are the hallmarks of a scientific mindset. It suggests that true understanding and sagacity emerge from this inquisitive engagement with the world, promoting a lifelong habit of critical thinking and exploration.

67. How does this first chapter aim to bridge the gap between students' prior experiences in the Preparatory Stage and the formal introduction of Science in the Middle Stage?

Ans :

This chapter bridges the gap by acknowledging and validating students' innate curiosity and exploratory experiences from the Preparatory Stage. It frames the formal introduction of Science in the Middle Stage not as a completely new or alien discipline, but as a continuation and enhancement of their natural desire to discover and understand. By emphasizing that science is an exciting journey fueled by asking questions—something children naturally do—it aims to make the transition smoother, fostering enthusiasm for the subject by connecting it to their inherent inquisitiveness.

68. What perspective does the chapter offer regarding questions that might not be immediately answerable within Grade 6? How does it portray the nature of scientific learning over time?

Ans :

The chapter reassures students not to be disheartened if all their questions aren't ed in Grade 6. It portrays scientific learning as a long-term, ongoing journey, stating they are "embarking upon a journey of science for the next five years or even beyond!" This perspective emphasizes that science is a process of continuous discovery rather than a collection of finite facts to be quickly memorized. It encourages sustained curiosity and patience, suggesting that deeper understanding unfolds progressively as they continue their exploration through their academic years and perhaps throughout their lives.

CASE BASED QUESTION

69. Rohan observed that ice cubes melt faster when crushed into smaller pieces compared to a single large ice cube of the same total weight. He wondered why this happens, even though the amount of ice is the same. He thought it might have something to do with how much of the ice touches the warmer air.

(i) What specific observation did Rohan make about melting ice?
(ii) What was Rohan's initial thought or hypothesis about why this occurs?
(iii) Explain scientifically why crushed ice melts faster, relating to Rohan's hypothesis.
(iv) Suggest a simple way Rohan could visually compare the surface area of a whole ice cube versus crushed ice.

Ans :

(i) Rohan observed that crushed ice cubes melt faster than a single large ice cube of the same total weight.

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(ii) Rohan thought it might be related to how much of the ice surface is in contact with the warmer air.
(iii) Crushing ice increases its total surface area exposed to the warmer surrounding air. More surface area means more contact points for heat transfer from the air to the ice, causing it to absorb heat and melt more quickly.
(iv) Rohan could imagine dipping both in paint and then seeing how much area is painted; the crushed ice would show a much larger total painted area.

70. During a school trip to a botanical garden, Priya noticed that some plants had labels indicating they "close their leaves at night." That evening, she observed a plant in her own balcony whose leaves seemed to droop and fold inwards as it got dark. She wondered if this was a common behavior and why plants might do it.
(i) What observation in the botanical garden and her balcony made Priya curious?
(ii) What question did Priya's observation lead her to ask?
(iii) Suggest one possible reason why some plants might close their leaves at night.
(iv) If Priya wanted to investigate further, what simple observation could she make over several days regarding her balcony plant and daylight?

Ans :

(i) Priya noticed plants that close their leaves at night in the garden and observed similar behavior in her balcony plant.
(ii) Priya wondered if this leaf-closing behavior was common and why plants might do it.
(iii) Closing leaves at night might help some plants conserve water by reducing surface area exposed to cooler night air, or it could be a way to protect against nocturnal herbivores or even conserve energy.
(iv) Priya could observe her balcony plant at different times: sunrise, midday, sunset, and after dark for several days, noting the position of its leaves to see if there is a consistent pattern related to light.

71. Ali was trying to dissolve sugar in three glasses of water: one with cold water, one with tap water (room temperature), and one with warm water. He used the same amount of sugar and water in each glass and stirred them equally. He noticed a difference in how quickly the sugar disappeared in each glass.
(i) What was Ali trying to investigate with his three glasses of water and sugar?
(ii) What difference did Ali likely observe regarding the sugar in the three glasses?
(iii) Based on common scientific understanding, explain why this difference occurs.
(iv) If Ali wanted to make his experiment more precise, what is one thing he should ensure is exactly the same for all three glasses, besides the amount of sugar and water?

Ans :

(i) Ali was trying to investigate how water temperature affects the speed at which sugar dissolves.
(ii) Ali likely observed that the sugar dissolved fastest in the warm water, slower in the tap water, and slowest in the cold water.
(iii) Sugar dissolves faster in warmer water because the water molecules have more energy and move more quickly, leading to more frequent collisions with sugar particles, breaking them apart and dispersing them faster.
(iv) Ali should ensure that the stirring method (speed and duration) is exactly the same for all three glasses to ensure a fair comparison.

72. While playing with a magnet, Sonia discovered that it attracted her steel hairpin but did not attract a copper coin or a plastic button. She tried it on various small objects around her house and started to group them based on whether they were attracted to the magnet or not.
(i) What initial discovery did Sonia make with her magnet?
(ii) What activity did Sonia engage in after her initial discovery?
(iii) What property of materials was Sonia exploring through her activity?
(iv) If Sonia found that an iron nail and a steel paperclip were attracted, but an aluminum foil piece was not, what could she conclude about aluminum compared to iron and steel?

Ans :

(i) Sonia discovered that her magnet attracted a steel hairpin but did not attract a copper coin or a plastic button.
(ii) Sonia started testing the magnet on various small objects and began grouping them based on their attraction to the magnet.
(iii) Sonia was exploring the magnetic property of materials, specifically identifying which

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materials are magnetic (attracted to a magnet) and which are non-magnetic.

(iv) Sonia could conclude that aluminum is a non-magnetic material, unlike iron and steel, which are magnetic materials.

73. A group of students was tasked with finding out how the length of a simple pendulum (a weight tied to a string) affects the time it takes to make one complete swing (its period). They made pendulums of different string lengths and timed 10 swings for each, then calculated the time for one swing.

(i) What were the students investigating about a simple pendulum?

(ii) What did they vary in their experiment, and what did they measure?

(iii) Why was it a good idea for them to time 10 swings and then calculate the time for one swing, rather than just timing one swing?

(iv) If they observed that longer pendulums took more time for one swing, what relationship would they be discovering?

Ans :

(i) The students were investigating how the length of a simple pendulum's string affects the time it takes for one complete swing (its period).

(ii) They varied the length of the pendulum string and measured the time taken for 10 swings (to then calculate the time for one swing).

(iii) Timing 10 swings and then dividing by 10 reduces the impact of human reaction time errors in starting and stopping the timer, leading to a more accurate average time for a single swing.

(iv) They would be discovering a direct relationship: as the length of the pendulum increases, the time period (time for one swing) also increases.

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CHAPTER 2

DIVERSITY IN THE LIVING WORLD

SUMMARY

1. INTRODUCTION TO NATURE'S VARIETY

Our world is full of an amazing variety of plants and animals. This wide range of living things is what we call biodiversity. Just like good people who help others, trees also provide for others by giving shade and fruits. Exploring nature helps us see this wonderful diversity. For example, different birds have their own unique chirps, which is a sign of nature's variety. When we observe nature, it's important to respect all living creatures and watch them without causing any disturbance.

1.1 Diversity in Plants and Animals Around Us

When we take a nature walk, we can see many different kinds of plants like grasses, bushes and tall trees. We can also spot various animals such as birds, butterflies, and monkeys. Plants show a lot of differences: some are tall and some are short, some have hard stems while others have soft stems. Their leaves also vary in shape and how they are arranged on the stem. Flowers too come in many colors, shapes, and smells.

Similarly, animals live in different places; some live on land, some on trees, and some in water like fish. Animals also eat different kinds of food and move in various ways. The variety of plants and animals found in a specific area is called the biodiversity of that region. Each living thing in this biodiversity has a role. For instance, trees give food and shelter to animals, and animals help spread seeds. This shows that plants and animals depend on each other.

1.2 How to Group Plants and Animals?

To understand the vast number of plants and animals better, we can group them based on their similarities and differences. Grouping helps us organize and study them more easily. For example, we can group plants by their height or whether they have flowers. We can group animals by what they eat, where they live, their color, or how they move.

1. How to group plants?

Plants have different features in their stems, leaves, and flowers. Stems can be thick or thin, tall or short, hard or soft. Leaves can differ in shape, color, size, and arrangement.

Based on height and stem type, plants can be grouped into herbs, shrubs, and trees.

Herbs are usually small plants with soft and green stems, like a tomato plant.

Shrubs are medium-sized plants, not as tall as trees, with many brown woody stems that branch out near the ground. Their stems are hard but not very thick, like a rose plant.

Trees are tall plants with hard, thick, brown, woody stems. Their branches usually start higher up on the stem, like a mango tree.

Some plants have weak stems and need support to climb; these are called climbers. Others creep along the ground and are called creepers.

Plants can also be grouped based on the pattern of veins on their leaves, called venation. If the veins form a net-like pattern on both sides of a middle vein, it's called reticulate venation, like in hibiscus leaves. If the veins run parallel to each other, it's called parallel venation, like in banana and grass leaves.

Another way to group plants is by their roots. Some plants have a taproot system, which consists of one main root with smaller side roots, like in mustard and hibiscus. Other plants, like grass, have fibrous roots, which are a bunch of similar-sized thin roots growing from the base of the stem. There's often a relationship between leaf venation and root type. Plants with reticulate venation usually have taproots, while those with parallel venation typically have fibrous roots. For example, chickpea (chana) has taproots and reticulate venation, and wheat has fibrous roots and parallel venation.

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Plants can also be grouped based on their seeds. Some seeds, like chickpea, can be split into two parts called cotyledons; plants with such seeds are dicotyledons (dicots). Other seeds, like maize, have a single cotyledon; these plants are monocotyledons (monocots). Dicot plants generally have reticulate venation and a taproot system, while monocot plants usually have parallel venation and a fibrous root system.

2. How to group animals?

Animals, like plants, show great differences and can be grouped in many ways. One way is by how they move. Animals can fly, run, crawl, walk, or jump, using different body parts like wings or legs. Grouping animals based on features like movement, shape, size, color, or structure helps us understand their diversity.

1.3 Plants and Animals in Different Surroundings

Different animals and plants live in different surroundings. For example, fish live in water and have streamlined bodies and fins to swim. Goats live in grassy areas and use legs to move. The types of plants and animals found in one region are often different from those in another region. For example, cactus plants with thick, fleshy stems are found in hot deserts like Rajasthan, which help them store water. Deodar trees, found in cold mountains like the Himalayas, are conical with sloping branches, allowing snow to slide off easily.

The biodiversity of a region varies because of these different conditions. Camels in hot deserts have long legs and wide hooves to walk on sand, and one hump to store food. Camels in cold deserts, like Ladakh, have shorter legs for mountainous areas and two humps, plus long hair for warmth. These special features that help plants and animals survive in their particular region are called adaptations.

The place where a plant or animal naturally lives is called its habitat. A habitat provides food, water, air, shelter, and other needs for survival. Many kinds of plants and animals can share the same habitat. Habitats can be broadly grouped into terrestrial (land-based) and aquatic (water-based). Terrestrial habitats include forests, deserts, grasslands, and mountains. Aquatic habitats include ponds, lakes, rivers, and oceans. Animals like frogs that can live both in water and on land are called amphibians.

If a habitat is damaged, plants and animals lose their homes and food, which leads to a loss of biodiversity. This has happened to animals like the Bengal Tiger, Cheetah, and Great Indian Bustard in India due to loss of their natural habitats. It is very important to protect biodiversity to ensure our planet remains full of life. One way communities protect biodiversity is through sacred groves, which are undisturbed patches of forests protected by local people.

NCERT ACTIVITY

Activity 2.1 : Let us explore and record

1. Plan a nature walk with your teacher to a park or a nearby forest.
2. While on the nature walk, observe different plants, insects, birds, and other animals. Also, note the weather conditions, whether it is hot, cold, windy and so on.
3. You can collect different types of fallen leaves or flowers and create a scrapbook.
4. Take care of the plants and animals in nature. Ensure that you do not disturb the plants and animals in the park. Do not pluck leaves and flowers.
5. Record your observations in Table about the features of stems, leaves, flowers and anything interesting in various plants. Some examples have been given for you in Figure and Table.

Figure : Examples of different features of some plants

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Table : Observations of different plants around us

S. no.	Local name of plant	Stem	Leaves (shape/ arrangement of leaves)	Flowers	Any other observations and features
1.	Common grass	Soft and thin	A single leaf grows alternatively from different points on the stem		Green leaves
2.	Tulsi	Hard and thin	Arrangement of a pair of leaves in the opposite directions	Pinkish purple	
3.	Hibiscus	Hard			
4.	Neem	Hard and thick			Leaves with smooth surface, bitter taste
5.	Rose				

Table : Observations of different animals around us

S. no.	Name of the animal (local name)	Place where they live	Food they eat	The way the move around	Any other observations and features
1.	Crow	Tree	Insects	Fly and walk	Carrying a twig in its beak
2.	Ant	Nest in soil and burrow	Leaves, seeds and insects		Have six legs
3.	Cow		Grasses, leaves		

Ans :

Table : Observations of different plants around us

S. no.	Local name of plant	Stem	Leaves (shape/ arrangement of leaves)	Flowers	Any other observations and features
1.	Common grass	Soft and thin	A single leaf grows alternatively from different points on the stem		Green leaves
2.	Tulsi	Hard and thin	Arrangement of a pair of leaves in the opposite directions	Pinkish purple	Strong smell
3.	Hibiscus	Hard	Oval shape, serrated margin, alternate arrangement	Large, red	Prominent stamen
4.	Neem	Hard and thick	Many small leaflets on a single stalk, opposite arrangement	Small, white	Leaves with smooth surface, bitter taste
5.	Rose	Hard with thorns	Compound leaves, oval leaflets with toothed edges, alternate arrangement	Pink, red, etc.	Pleasant smell, thorns on stem

Table : Observations of different animals around us

S. no.	Name of the animal (local name)	Place where they live	Food they eat	The way the move around	Any other observations and features
1.	Crow	Tree	Insects	Fly and walk	Carrying a twig in its beak
2.	Ant	Nest in soil and burrow	Leaves, seeds and insects	walk	Have six legs
3.	Cow	earth	Grasses, leaves	walk	Have four legs and two horns

Activity 2.2 : Let us appreciate

1. Close your eyes for 30 seconds and think of one plant and one animal that you have closely observed and appreciated very much.
2. Now each one of you can draw the plant and animal that you thought of on the blackboard.
3. What are your observations about the various plants and animals that have been drawn?
4. How many different plants and animals did the entire class draw on the blackboard?
5. Do you think that there may be many more varieties of plants and animals other than those drawn on the board?

Ans :

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1. I thought of a rose plant and a squirrel. I have observed the rose plant in my garden. It has red flowers, green leaves, and small thorns on its stem. The squirrel I often see runs quickly on trees, has a bushy tail, and eats nuts.
2. I drew the rose plant with flowers and the squirrel climbing a tree on the blackboard.
3. When I looked at the drawings made by my classmates, I observed that there were many different types of plants and animals. Some students drew trees like mango, neem, or coconut, while others drew animals like elephants, cats, birds, and butterflies. This showed that everyone has noticed different living things in their surroundings.
4. In total, our class drew around 10 different types of plants and 15 different types of animals. This shows that even within one class, there is a wide range of knowledge and observation about nature.
5. Yes, I do believe that there are many more varieties of plants and animals than what we drew. The Earth has millions of species, and we have seen and drawn only a few. This activity helped us understand how rich and diverse nature is.

Activity 2.3 : Let us group

1. Collect pictures of various other plants and animals. Cut their pictures from old magazines, newspapers, charts and other sources. Paste each of these pictures on a different card.
2. Divide your class in groups of 5-6 students each.
3. Pool the cards prepared by the students in your group.
4. Observe various features of plants and animals shown on the cards.
5. Recall the features of plants and animals that you have listed in Tables.
6. Group them on the basis of common features.
7. Share and discuss the basis of grouping you have made with other groups in your class.

You will be surprised to see that the basis used by different groups may vary. What do you think are the reasons behind it? Different students might have chosen different common features for the grouping. For example, some students may have chosen the height of plants as the basis for grouping while others might have chosen presence or absence of flowers as the basis for grouping of plants (See Figure).

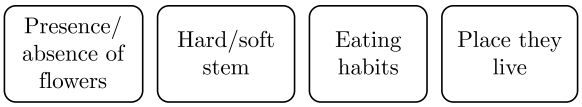

Figure : Some possible criteria of groupings of plants and animals

Ans :

Our group collected about 30 picture cards of different plants and animals.
For plants, one way we grouped them was:
Plants that give flowers (e.g., rose, sunflower, hibiscus).
Plants that do not give prominent flowers (or we couldn't see them in the picture, e.g., ferns, moss, pine tree). Another way we grouped plants was by their size:
Tall plants (e.g., coconut tree, mango tree).
Medium-sized plants (e.g., lemon plant, rose bush).
Small plants (e.g., grass, mint).
For animals, one way we grouped them was by where they live:
Animals that live on land (e.g., lion, elephant, dog).
Animals that live in water (e.g., fish, dolphin, octopus).
Animals that can fly (e.g., bird, bat, butterfly).
Another way we grouped animals was by what they eat (based on our general knowledge):
Animals that eat plants (e.g., cow, deer, rabbit).
Animals that eat other animals (e.g., tiger, snake, eagle).
When we discussed with other groups, we found they used different features for grouping. For plants, one group used "hard stem" vs "soft stem". For animals, another group used "has fur" vs "has feathers" vs "has scales".
The reasons for these different groupings are that different groups chose different common features that they thought were important or easy to see in the pictures. There are many ways to group the same set of plants and animals depending on which characteristic you focus on.

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Activity 2.4 : Let us group

1. Let us go on a nature walk again for some more interesting observations.
2. Look closely at the height of different plants. Are these plants shorter than you, as tall as you, or taller than you?
3. Is the stem brown or green? Touch and feel the stems and try to bend them gently. Can

you bend the stem easily, or is it stiff? Take care that the stems do not break.

4. Also, observe from where the branches of the plants arise-whether they arise close to the ground or higher up on the stem. Fill in your observations in Table. A few examples are already given.

Table : Grouping of plants based on height and nature of stem

(Students are expected to fill this table based on their observations. An example for Tomato is provided in the text, and Mango and Rose are given in the table. Below is how it could be completed for Tomato.)

S. no.	Name of the plant	Height (Short/ Medium/ Tall)	Nature of stem (Green/ Brown)	Nature of stem (Tender/ Hard)	Nature of stem (Thin/ Thick)	Appearance of branches (Close to the ground/ Higher up on the stem)	Name of plant group
1.	Mango	Tall	Brown	Hard	Thick	Higher up on the stem	Tree
2.	Rose	Medium	Brown	Hard	Thin	Close to the ground	Shrub
3.	Tomato	Short	Green	Tender	Thin	Close to the ground	Herb
4.	Grass	Short	Green	Tender	Thin	Arises from the ground	Herb
5.	Lemon Plant	Medium	Brown (older parts), Green (younger parts)	Hard	Medium Thick	Close to the ground	Shrub

Ans :

During our nature walk, we observed different plants.

The mango tree was much taller than us. Its stem was brown, very hard, and thick. The branches started higher up on the stem. So, it is a Tree.

The rose plant was about my height (medium). Its stem was brown, hard, but thin. It had many branches starting close to the ground. So, it is a Shrub.

The tomato plant was shorter than me. Its stem was green, tender (soft), and thin. Its branches also appeared close to the ground. So, it is a Herb.

We also looked at grass. It was very short, with green, tender, and thin stems. It is also a Herb.

A lemon plant we saw was medium height. Its older stems were brownish and hard, while newer stems were green and a bit softer. The stem was of medium thickness, and branches started near the ground. So, it is a Shrub.

Activity 2.5 : Let us compare

1. Look at the leaves of different plants collected by you, during the nature walk.
2. Do you notice any variation in the shape and structure of these leaves?

You may observe thin lines on the leaves of the plants (Figure (a)). These are veins. The pattern of veins on the leaf is called venation. What differences do you see in the veins of leaves shown in Figure (a) and Figure (b)?

(a) Hibiscus leaf *with* reticulate venation

(b) *Banana leaf with parallel venation*

(c) *Grass leaf with parallel venation*

Figure : Leaves showing different types of venation

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Ans :

Yes, when we looked at the fallen leaves we collected, we noticed a lot of variation.

Shape and Structure: Some leaves were long and narrow (like grass), some were broad and somewhat round (like a lotus leaf, if we had one), some were heart-shaped, and some had toothed edges (like hibiscus or rose leaflets). Some leaves were small, others were large. Some were thick, and some were thin.

Veins and Venation: We observed the thin lines called veins on the leaves.

In the hibiscus leaf Figure (a), the veins form a net-like pattern on both sides of a main, thick middle vein. This is called reticulate venation.

In the banana leaf Figure (b), the veins run parallel to each other. This is called parallel venation.

The grass leaf Figure (c) also shows veins running parallel to each other, so it also has parallel venation.

So, the main difference is that in reticulate venation, the veins branch out and form a network, while in parallel venation, they run alongside each other without forming a network.

Activity 2.6 : Let us find out

1. Visit an open area where wild herbs and grasses are growing. You may use small herbs for this exercise.
2. Using a khurpi (trowel), carefully dig out a few different herbs without damaging the roots. To do this, you may wet the soil and loosen it.
3. Wash the roots with water and observe them.
4. After you are done observing, make sure to replant the herbs so that they may continue to thrive and grow.

What are the similarities and differences in the roots of the plants collected by you? What differences do you see in the roots of plants shown in Figure (a) and Figure (b)?

(a) Taproot system in a mustard plant

(b) Fibrous root system in common grass

Figure : Types of roots

Ans :

We went to an open area and carefully dug out a small weed (like a common broadleaf weed) and some grass, making sure to wet the soil first so the roots wouldn't break. We washed the roots with water.

Similarities and Differences in Collected Roots:

The roots of the weed had one main, thick root going downwards, with smaller, thinner roots coming out from its sides.

The roots of the grass looked like a bunch of many thin, similar-sized roots spreading out from the base of the stem.

A similarity is that all roots help to hold the plant in the soil. Differences were in their structure – one had a main root, the other had a bushy bunch.

Differences in Figure (a) and Figure (b):

In Figure (a) (mustard plant), there is one main, prominent root that goes deep into the soil, and smaller roots branch off from this main root. This is called a taproot.

In Figure (b) (common grass), there is no single main root. Instead, there is a cluster or bunch of many thin, fibre-like roots that arise from the base of the stem. These are called fibrous roots.

After observing, we carefully replanted the herbs.

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Activity 2.7 : Let us relate and analyse

1. Collect saplings of five common plants from your school nursery or any other nurseries to plant in your school garden. Examples of such plants can include lemongrass, marigold, sadabahar (periwinkle), and others.
2. Before planting them, observe their roots and the venation in their leaves.
3. Record your observations in Table.

Table : Types of leaf venation and roots

S. no.	Name of the plant	Type of leaf venation (reticulate / parallel)	Type of root (taproot / fibrous)
1.	Lemongrass	Parallel	Fibrous
2.	Marigold	Reticulate	Taproot
3.	Sadabahar	Reticulate	Taproot
4.	Wheat (sapling)	Parallel	Fibrous
5.	Bean (sapling)	Reticulate	Taproot

Ans :

We collected saplings of lemongrass, marigold, sadabahar, a wheat sapling, and a bean sapling. We observed their leaves and roots before planting.
Lemongrass: The leaves had veins running parallel to each other (parallel venation), and the roots were a bunch of thin fibers (fibrous roots).
Marigold: The leaves had a net-like pattern of veins (reticulate venation), and it had a main root with smaller branches (taproot).
Sadabahar (Periwinkle): The leaves showed reticulate venation, and the roots formed a taproot system.
Wheat (sapling): The leaves had parallel venation, and the roots were fibrous.
Bean (sapling): The leaves showed reticulate venation, and it had a taproot.
Relation between leaf venation and types of root: Yes, we observed a relation. Plants like marigold, sadabahar, and bean, which had reticulate venation in their leaves, also had taproots. Plants like lemongrass and wheat, which had parallel venation in their leaves, had fibrous roots.
This matches what the book says: generally, plants with reticulate venation have taproots, while those with parallel venation have fibrous roots.

Activity 2.8 : Let us compare

1. Soak some chickpea and maize seeds in water for two or three days.
2. Remove the seed coat of a chickpea. Now, observe the structure of the chickpea and maize seeds. Are they similar or different?

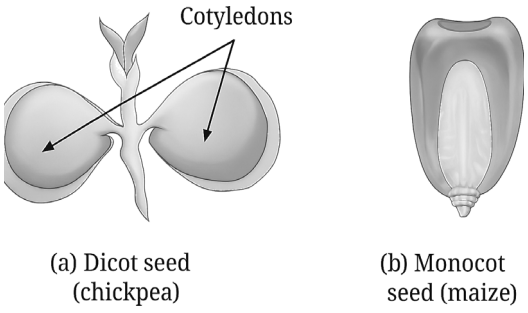

Figure : Dicot and monocot seeds

Ans :

After soaking chickpea and maize seeds for two days, we observed them.
Chickpea Seed: When we removed the seed coat of the chickpea, we found that the seed could be easily split into two equal halves. These two parts are the cotyledons. So, chickpea has two cotyledons.
Maize Seed: The maize seed did not split into two parts like the chickpea. Even after soaking, it remained as a single piece. It has only one cotyledon.
Similarities/Differences:
They are different. The most obvious difference is that the chickpea seed has two cotyledons (it's a dicot seed), while the maize seed has only one cotyledon (it's a monocot seed). The chickpea seed is also more rounded, while the maize seed is flatter and somewhat shield-shaped.

Activity 2.9 : Let us find out

You have recorded the movement of a few animals in Table. You may have also observed how other animals move from place to place. Let us now think about the types of movement in animals. A number of animals are shown in Figure. You can add more animals that you may have observed and create a poster on the variety of animals. Which body parts are used by the animals in the poster you created and those in Figure for movement?

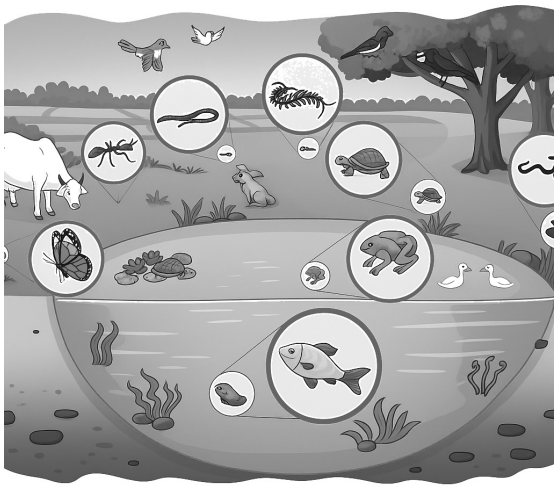

Figure : Diversity in animals

1. List these animals in Table.
2. Note the ways in which these animals move and name the body parts used for movement. Some examples are given in Table.

Table : Movements in animals and their body parts involved

S. no.	Name of the animal	Type of movement	Body parts used for movement
1.	Ant	Walks, crawls	Legs
2.	Goat	Walks and jumps	Legs

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3.	Pigeon	Walks and flies	Legs and wings
4.	Housefly	Walks and flies	Legs and wings
5.	Fish	Swims	Fins
6.	Snake	Slithers, crawls	Whole body (muscles and scales)
7.	Frog	Hops, swims	Legs (hind legs for hopping/ swimming), webbed feet
8.	Earthworm	Crawls	Body segments, muscles, setae (bristles)

Ans :

Animals use different body parts for movement.
Ant: Walks and crawls using its legs.
Goat: Walks and jumps using its legs.
Pigeon: Walks using its legs and flies using its wings.
Housefly: Walks using its legs and flies using its wings.
Fish: Swims using its fins.
Snake (from Figure): Slithers or crawls using its whole body, with the help of muscles and scales.
Frog (from Figure): Hops on land using its powerful hind legs and swims in water using its legs, often with webbed feet.
Earthworm (from Figure): Crawls by alternately shortening and lengthening its body segments, using muscles and tiny bristles called setae.
Butterfly (from Figure): Flies using its wings.
Rabbit (from Figure): Hops and runs using its legs.
Tortoise (from Figure): Walks slowly using its legs.
Conclusions from Table: Different animals have different ways of moving, like walking, flying, swimming, crawling, hopping, etc. They use different body parts for these movements, such as legs, wings, fins, or even their whole body.

Activity 2.10 : Let us compare and analyse

1. Look at Table. Recreate a similar table on the blackboard.
2. List the names of plants and animals you or your classmates have observed in the regions given in the table or already know about. A few examples are given. You can add more.

Table : Animals and plants found in different surroundings

S. no.	In the desert	On mountains	In the ocean	Any other region (In the forest)	In a pond (example added region)
1.	Camel	Deodar tree	Fish	Lion	Lotus
2.	Cactus	Mountain Goat	Whale	Tiger	Tadpole
3.	Date Palm	Pine tree	Shark	Deer	Duck
4.	Desert Fox	Yak	Octopus	Monkey	Water beetle
5.	Scorpion	Rhodo-dendron	Sea turtle	Elephant	Frog

Ans :

Observations regarding plants and animals in various regions:
The plants and animals found in one type of region are often very different from those found in another.
In the desert: We listed Camel, Cactus, Date Palm, Desert Fox, and Scorpion. These are adapted to hot and dry conditions with little water. For example, cactus has fleshy stems to store water. Camels can survive long without water.
On mountains: We listed Deodar tree, Mountain Goat, Pine tree, Yak, and Rhododendron. These are adapted to cold conditions, and sometimes snow and strong winds. Deodar trees are conical so snow slides off. Mountain goats have features for climbing. Rhododendrons on mountain tops might be shorter with smaller leaves.
In the ocean: We listed Fish, Whale, Shark, Octopus, and Sea turtle. These animals are adapted to live in saltwater and have features for swimming, like fins or streamlined bodies.
In the forest: We listed Lion, Tiger, Deer, Monkey, and Elephant. Forests have many trees and provide shelter and food for a variety of animals.
In a pond: We listed Lotus, Tadpole, Duck, Water beetle, and Frog. These are adapted to freshwater environments. Lotus plants have leaves that float. Ducks have webbed feet for swimming.
This shows that biodiversity varies greatly from region to region because the environmental conditions (like temperature, water availability, type of land) are different, and plants and animals have special features (adaptations) to survive in their specific ha

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NCERT EXERCISE

1. Here are two types of seeds. What differences do you find among the roots and leaf venation of their plants?

(a) Wheat

(b) Kidney beans

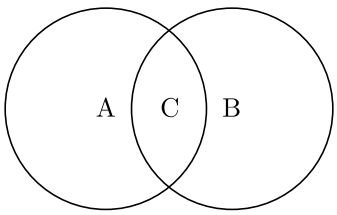
Ans :

(a) Wheat plant: It has fibrous roots (many thin roots arising from the stem-base) and its leaves show parallel venation (veins run side-by-side from base to tip).

(b) Kidney-bean plant: It has a tap root (one main thick root with smaller side roots) and its leaves show reticulate venation (veins form a network pattern).

2. Names of some animals are given below. Group them based on their habitats. Write the names of aquatic animals in the area marked 'A' and terrestrial animals in the area marked 'B'. Enter the names of animals living in both habitats in part 'C'.

Horse, Dolphin, Frog, Sheep, Crocodile, Squirrel, Whale, Earthworm, Pigeon, Tortoise



Ans :

Region	Habitat type	Animals
A	Only Aquatic	Dolphin, Whale
B	Only Terrestrial	Horse, Sheep, Squirrel, Earthworm, Pigeon
C	Both Aquatic & Terrestrial (Amphibious/ Semi-aquatic)	Frog, Crocodile, Tortoise

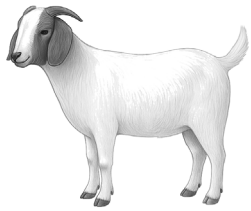
3. Manu's mother maintains a kitchen garden. One day, she was digging out radish from the soil. She told Manu that radish is a kind of root. Examine a radish and write what type of root it is. What type of venation would you observe in the leaves of radish plant?

Ans :

Radish is a tap root that has become thick and fleshy to store food. The leaves of the radish plant show reticulate venation, where the veins branch and form a network.

4. Look at the image of a mountain goat and a goat found in the plains. Point out the similarities and differences between them. What are the reasons for these differences?

(a) Mountain Goat



(b) Goat found in the plains

Ans :

Aspect	Mountain Goat	Plain-land Goat	Reason
Similarities	Both are mammals, have four legs, cloven hooves and eat plants (herbivores).	–	These are common features of goats as a species.
Body build	Stocky body, shorter legs but very strong muscles.	Comparatively slimmer body, normal leg strength.	Strong, short legs give better balance on steep, rocky slopes.
Feet / Hooves	Hooves are harder and have rough pads for gripping rocks.	Hooves are smoother—good for flat ground.	Adaptation for sure footing on mountains.

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Hair / Fur	Thick, long coat to keep warm in cold heights.	Thinner coat suited to warmer plains.	Temperature difference between mountains and plains.
Horns	Usually longer, more curved for protection in wild terrain.	Often shorter (varies by breed).	Wild mountain life needs stronger defence.

5. Group the following animals into two groups based on any feature other than those discussed in the chapter—cow, cockroach, pigeon, bat, tortoise, whale, fish, grasshopper, lizard.

Ans :

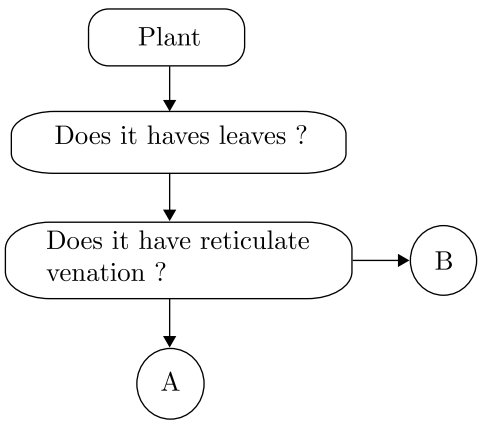
Animals that can fly	Animals that cannot fly
Pigeon, Bat, Cockroach, Grasshopper	Cow, Tortoise, Whale, Fish, Lizard

6. As the population grows and people want more comfortable lives, forests are being cut down to meet various needs. How can this affect our surroundings? How do you think we can address this challenge?

Ans :

Cutting forests removes the homes of many plants and animals, reduces rainfall, causes soil to wash away, and increases the amount of carbon dioxide in the air, making Earth warmer. We can plant more trees (afforestation), save paper and wood, use recycled or alternative materials, support laws that protect forests, and spread awareness so everyone understands why trees are important.

7. Analyse the flow-chart. What can be examples of 'A' and 'B'?



Ans :

A (reticulate venation examples): Hibiscus, Mango, Pea.
B (parallel venation examples): Wheat, Rice, Maize.

8. Raj argues with his friend Sanjay that "Gudhal (hibiscus) plant is a shrub." What questions can Sanjay ask for clarification?

Ans :

Sanjay could ask:
1. How tall does the hibiscus plant normally grow?
2. Does the main stem stay woody and branch close to the ground?
3. Are the branches hard (woody) or soft (herbaceous)?
4. Does the plant live for several years or just one season?
5. Does it have many equal-sized stems rather than one thick trunk?

These points help decide whether a plant is a shrub, herb, or tree.

9. Based on the information in the table, find out examples of these plants for each group.

Group	Type of seed	Type of root	Examples (any correct set)
A	Dicot	Taproot	
B	Monocot	Fibrous roots	

(a) What other similarities do plants of group A have?
(b) What other similarities do plants of group B have?

Ans :

Group	Type of seed	Type of root	Examples (any correct set)
A	Dicot	Taproot	Pea, Hibiscus, Mango, Mustard
B	Monocot	Fibrous roots	Wheat, Rice, Maize, Grass

Plants in group A (dicots) usually:
1. Have two seed leaves (two cotyledons) inside the seed.
2. Show reticulate (net-like) venation in their leaves.

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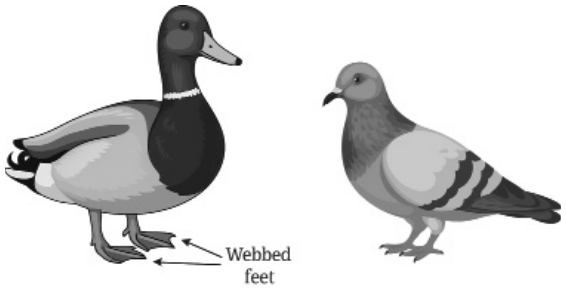
3. Often have flowers with 4 or 5 petals (or their multiples).

Plants in group B (monocots) usually:

1. Have one seed leaf (one cotyledon) inside the seed.
2. Show parallel venation in their leaves.
3. Often have flowers with petals in multiples of 3.

10. Observe the labelled part of a duck in the picture below. What differences do you observe in the feet of the duck compared to the other birds? Which activity would the duck be able to perform using this part?



(a) Duck *(b) Pigeon*

Ans :

The duck's feet are webbed—a thin skin stretches between its toes, making each foot look like a paddle. In birds such as the pigeon, the toes are separate and end in claws for perching. Because of its webbed feet, the duck can swim efficiently; the broad surface pushes against water just like oars, helping the bird move smoothly in ponds and lakes.

MULTIPLE CHOICE QUESTION

1. What is biodiversity?

(A) The study of a single species in a specific area.
(B) The variety of plants and animals found in a particular region.
(C) The total number of animals in an ecosystem.
(D) The interaction between plants and their environment.

Ans :

(B) The variety of plants and animals found in a particular region.

Biodiversity refers to the wide range of plant and animal life present in a specific habitat or geographical area. This variety contributes to the overall health and balance of the ecosystem.

2. What did Dr. Raghu advise the students to notice during the nature walk, emphasizing respect for living creatures?

(A) Only the different types of trees.
(B) The variety of smells and to observe without disturbing.
(C) The colors of the flowers exclusively.
(D) The number of insects they could find.

Ans :

(B) The variety of smells and to observe without disturbing.
Dr. Raghu advised the students to notice the variety of smells in the park and emphasized respecting all living creatures by observing them without causing any disturbance during their nature walk.

3. Why is grouping plants and animals important in science?

(A) It makes it harder to study individual species.
(B) It primarily helps in naming new organisms.
(C) It makes it easier to understand and study them based on similarities and differences.
(D) It is only useful for creating museum exhibits.

Ans :

(C) It makes it easier to understand and study them based on similarities and differences.
Grouping organisms based on shared characteristics (similarities) and distinguishing features (differences) helps in organizing the vast diversity of life, making it more manageable to study and understand relationships between different organisms.

4. What are plants with soft, green, and tender stems, typically small in size, called?

(A) Trees
(B) Shrubs
(C) Herbs
(D) Creepers

Ans :

(C) Herbs
Herbs are characterized by their relatively small size and stems that are soft, green, and tender. Tomato plants are an example of herbs.

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5. Which of the following plants is an example of a shrub?
(A) Mango tree
(B) Tomato plant
(C) Rose plant
(D) Common grass

Ans :

(C) Rose plant
The shrubs as plants that are not as tall as trees, often with many brown woody stems branching near the ground. A rose plant is cited as an example.

6. What is the primary basis for classifying plants into herbs, shrubs, and trees?
(A) The color and shape of their flowers.
(B) The height and nature of their stems.
(C) The type of fruits they produce.
(D) The environment in which they grow.

Ans :

(B) The height and nature of their stems.
On observing plant height and stem characteristics (like hardness, thickness, and branching patterns) to group them into herbs, shrubs, or trees.

7. What is venation in leaves?
(A) The color pattern on the leaf surface.
(B) The texture of the leaf.
(C) The pattern of veins on the leaf.
(D) The way leaves are attached to the stem.

Ans :

(C) The pattern of veins on the leaf.
Venation refers to the arrangement or pattern of veins, which are thin lines visible on the surface of a leaf. These veins are crucial for transporting water and nutrients.

8. What is the main difference between reticulate venation and parallel venation in leaves?
(A) Reticulate venation has veins parallel to each other, while parallel venation has a net-like pattern.
(B) Reticulate venation is found in grasses, while parallel venation is found in hibiscus.
(C) Reticulate venation forms a net-like pattern, while parallel venation has veins running parallel.
(D) Reticulate venation refers to thick veins, while parallel venation refers to thin veins.

Ans :

(C) Reticulate venation forms a net-like pattern, while parallel venation has veins running parallel.
Reticulate venation is characterized by a web-like or net-like arrangement of veins, as seen in hibiscus leaves. Parallel venation features veins that run parallel to one another, typical of banana or grass leaves.

9. What type of root system consists of one main root with smaller side roots arising from it?
(A) Fibrous root system
(B) Taproot system
(C) Adventitious root system
(D) Prop root system

Ans :

(B) Taproot system
A taproot system is characterized by a prominent, central main root (the taproot) from which smaller, lateral roots branch out. The mustard plant is an example of this.

10. Which type of root system is generally found in common grass plants?
(A) Taproot system
(B) Fibrous root system
(C) Prop root system
(D) Stilt root system

Ans :

(B) Fibrous root system
Common grass plants typically have a fibrous root system, where a bunch of similar-sized, thin roots arise from the base of the stem, rather than having a single main root.

11. What general relationship is observed between leaf venation and the type of root system in plants?
(A) Plants with reticulate venation usually have fibrous roots.
(B) Plants with parallel venation usually have taproots.
(C) Plants with reticulate venation usually have taproots, and those with parallel venation usually have fibrous roots.
(D) There is no general relationship between leaf venation and root type.

Ans :

(C) Plants with reticulate venation usually have taproots, and those with parallel venation usually have fibrous roots.
There is a general pattern where plants with reticulate (net-like) venation usually have

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taproots, while those with parallel venation typically have fibrous root systems.

12. What are cotyledons?
(A) The first leaves that emerge from a seed.
(B) The protective outer covering of a seed.
(C) The parts of a seed that can sometimes be split, like in a chickpea.
(D) The small roots that develop from a germinating seed.

Ans :

(C) The parts of a seed that can sometimes be split, like in a chickpea.
Cotyledons are embryonic leaves within a seed. In dicotyledonous plants like chickpeas, the seed can be split into two such parts. They often store food for the embryo.

13. How many cotyledons does a maize seed typically have?
(A) Two
(B) One
(C) Three
(D) None

Ans :

(B) One (single thin cotyledon)
Maize is an example of a monocotyledonous plant, meaning its seeds contain a single, often thin, cotyledon.

14. What are the typical characteristics of dicot plants regarding their leaf venation and root system?
(A) Parallel venation and fibrous root system.
(B) Reticulate venation and fibrous root system.
(C) Parallel venation and taproot system.
(D) Reticulate venation and taproot system.

Ans :

(D) Reticulate venation and taproot system.
Dicotyledonous (dicot) plants generally exhibit reticulate venation in their leaves and possess a taproot system, where there's a main central root.

15. Which of the following is NOT a main feature used to classify animals?
(A) The type of movement they exhibit.
(B) The body parts they use for movement.
(C) The sounds they make.
(D) Where they live (their habitat).

Ans :

(C) The sounds they make.
Although bird chirps are mentioned as an example of diversity, animals are mainly grouped based on how they move, the body parts they use for movement, and their habitats not primarily by the sounds they make.

16. How would you categorize the fact that a fish uses its fins to swim in water?
(A) Type of food and habitat.
(B) Type of movement and body parts used for movement.
(C) Color and size of the animal.
(D) Reproductive method and lifespan.

Ans :

(B) Type of movement and body parts used for movement.
The statement "a fish uses its fins to swim in water" relates directly to how the animal moves (swimming) and which body parts it uses for that movement (fins). This fits under the category of type of movement and body parts used for movement, making option (B) the correct choice.

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17. What are adaptations?
(A) The scientific names given to plants and animals.
(B) The general behaviors common to all living organisms.
(C) Special features that enable plants and animals to survive in a particular region.
(D) The diseases that affect plants and animals in specific habitats.

Ans :

(C) Special features that enable plants and animals to survive in a particular region.
Adaptations are specific physical or behavioral characteristics that have evolved in organisms, allowing them to live successfully and reproduce in their particular environment or habitat.

18. Which of the following is an example of a terrestrial habitat?
(A) Ponds
(B) Oceans
(C) Forests
(D) Rivers

Ans :

(C) Forests
Terrestrial habitats are defined as places where plants and animals live on land, with forests given as one example of this type of habitat.

19. Why does the biodiversity of a hot desert differ significantly from that of a cold mountainous region?
(A) Because animals in deserts are always larger.
(B) Because plants in mountains do not need water.
(C) Because plants and animals have different adaptations to survive the distinct environmental conditions.
(D) Because all species prefer mountainous regions for their beauty.

Ans :

(C) Because plants and animals have different adaptations to survive the distinct environmental conditions.
Different regions have vastly different environmental conditions (e.g., temperature, water availability). Organisms living in these regions possess specific adaptations (special features) that help them survive those particular conditions, leading to diverse forms of life.

20. What is a habitat?
(A) The food that an animal eats.
(B) The place where plants and animals live.
(C) The way an animal moves.
(D) The group to which a plant belongs.

Ans :

(B) The place where plants and animals live.
A habitat is the natural environment or home of a plant, animal, or other organism. It provides the resources necessary for survival, such as food, water, and shelter.

21. What unique feature helps deodar trees survive in snowy mountainous regions?
(A) They have very deep root systems.
(B) They produce brightly colored flowers to attract pollinators.
(C) Their conical shape and sloping branches allow snow to slide off easily.
(D) Their leaves are very thick and store a lot of water.

Ans :

(C) Their conical shape and sloping branches allow snow to slide off easily.
Deodar trees, found in mountainous regions with snowfall, have a conical shape and flexible, sloping branches. This structure is an adaptation that helps prevent snow accumulation, allowing them to survive such conditions.

22. How does the damage to habitats lead to a loss of biodiversity?
(A) It forces animals to learn new ways of finding food.
(B) It results in the loss of homes, food, and other resources for plants and animals.
(C) It primarily affects only the plant populations.
(D) It causes animals to migrate to more populated areas.

Ans :

(B) It results in the loss of homes, food, and other resources for plants and animals.
When habitats are damaged or destroyed, the plants and animals that depend on those habitats for survival lose their homes, food sources, and other essential resources, which can lead to a decline in their populations and ultimately, a loss of biodiversity.

23. What was the name of the movement that began in the early 1970s in Uttarakhand to stop the cutting of trees?
(A) Save Silent Valley movement
(B) Project Tiger
(C) Chipko movement
(D) Green India Mission

Ans :

(C) Chipko movement
The Chipko movement, which began in the early 1970s in Uttarakhand, was a significant environmental movement where local people, especially women, hugged trees to protect them from being felled, thus saving forests.

24. What are sacred groves ?
(A) Gardens specifically designed for growing medicinal plants.
(B) Man-made forests planted for commercial purposes.
(C) Undisturbed patches of forests protected by local communities.
(D) Areas designated for scientific research on trees.

Ans :

(C) Undisturbed patches of forests protected by local communities.
Sacred groves are traditionally protected patches of forest that are preserved by local communities, often due to religious or cultural beliefs. These areas harbor rich biodiversity because human interference is typically restricted.

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25. Who is referred to as the 'Birdman of India'?
(A) Dr. Raghu
(B) Maniram chacha
(C) Salim Ali
(D) Janaki Ammal

Ans :

(C) Salim Ali
Salim Ali, an eminent ornithologist, is known as the 'Birdman of India' for his extensive work on observing, documenting and conserving bird diversity across India.

26. Which of the following is an example that illustrates the interdependence between plants and animals?
(A) Trees competing for sunlight.
(B) Animals helping in spreading seeds after eating fruits.
(C) Birds building nests on trees without benefiting the tree.
(D) Different animal species competing for the same food source.

Ans :

(B) Animals helping in spreading seeds after eating fruits.
When animals consume fruits and then disperse the seeds through their droppings, they help in the propagation of plants. This is a clear example of the mutual dependence between plants and animals.

27. Which of the following is NOT a characteristic of a tree?
(A) Grows really tall.
(B) Has soft, green, and tender stems.
(C) Has hard, thick, brown, and woody stems.
(D) Branches typically start higher up on the stem.

Ans :

(B) Has soft, green, and tender stems.
Trees are characterized by their height, and hard, thick, woody stems. Soft, green, and tender stems are characteristic of herbs, not trees.

28. How do climbers and creepers differ in their growth habit?
(A) Climbers grow tall independently, while creepers need support.
(B) Climbers creep along the ground, while creepers need support to climb.
(C) Climbers need support to climb and grow, while creepers spread along the ground.
(D) Both climbers and creepers have very strong, woody stems.

Ans :

(C) Climbers need support to climb and grow, while creepers spread along the ground.
Plants with weak stems that use external support to grow upwards are called climbers. Plants that spread out horizontally along the ground are known as creepers.

29. A student observes a plant with leaves showing a net-like pattern of veins. Based on the information, what type of root system is this plant most likely to have?
(A) Fibrous root system
(B) Taproot system
(C) Adventitious roots
(D) No root system

Ans :

(B) Taproot system
It is generally observed that plants with reticulate (net-like) venation in their leaves, such as the rose (a dicot), usually have a taproot system—showing a common pattern in plant structure.

30. **Assertion (A) :** Camels found in hot deserts excrete small amounts of urine and have dry dung.
Reason (R) : These features are adaptations to conserve water in arid environments.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Camels in hot deserts producing concentrated urine and dry dung are crucial adaptations. These mechanisms minimize water loss, which is essential for survival in environments where water is scarce.

31. Consider the following statements about biodiversity:
1. It only refers to the variety of animals in a region.
2. Each member in the biodiversity of a region has a different role to play.
3. Damage to habitats does not affect biodiversity.

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Which of the above statements is/are correct?
(A) 1 only
(B) 2 only
(C) 1 and 3 only
(D) 2 and 3 only

Ans :

(B) 2 only
Biodiversity includes the variety of both plants and animals. Each organism plays a role in its ecosystem. Habitat damage directly leads to loss of biodiversity. Therefore, only statement 2 is correct.

32. During a nature walk, students are asked to group plants based on their stem characteristics. One plant is observed to be medium height with several hard, brown, woody stems branching out near the ground.
Into which group would this plant most likely be classified?
(A) Herb
(B) Shrub
(C) Tree
(D) Creeper

Ans :

(B) Shrub
Shrubs are described as plants of medium height with hard, woody stems that branch near the ground, which matches the description of a hibiscus plant.

33. The Botanical Survey of India was headed by an Indian botanist who initiated programs to document plant diversity. Who was this botanist?
(A) Salim Ali
(B) Dr. Raghu
(C) Janaki Ammal
(D) Maniram chacha

Ans :

(C) Janaki Ammal
Janaki Ammal, as the head of the Botanical Survey of India, played a crucial role in initiating programs to document the plant diversity of India, contributing significantly to its preservation.

34. Why are amphibians like frogs considered to have a unique habitat requirement compared to fish or goats?
(A) They only live in very cold environments.
(B) They can live in water as well as on land.
(C) They exclusively live on tall trees.
(D) They only consume insects for food.

Ans :

(B) They can live in water as well as on land.
Amphibians, such as frogs, are adapted to live both in aquatic environments (like water for breeding and early life stages) and terrestrial environments (on land). This dual habitat is a distinguishing characteristic.

35. What are plants called that have seeds with two cotyledons?
(A) Monocotyledons (monocots)
(B) Dicotyledons (dicots)
(C) Acotyledons
(D) Polycotyledons

Ans :

(B) Dicotyledons (dicots)
Plants whose seeds possess two cotyledons (embryonic leaves) are classified as dicotyledons, often shortened to dicots. Chickpeas are an example of dicots.

36. 'Project Tiger' was initiated in India in which year?
(A) 1970
(B) 1973
(C) 1987
(D) 2022

Ans :

(B) 1973
'Project Tiger' was launched in 1973 by the Government of India to protect the rapidly declining population of the Bengal Tiger.

37. Which feature distinguishes the stem of a tree from the stem of a herb?
(A) Tree stems are always green, while herb stems are brown.
(B) Tree stems are hard, thick, and woody, while herb stems are soft and green.
(C) Tree stems branch from the base, while herb stems do not branch.
(D) Tree stems are shorter than herb stems.

Ans :

(B) Tree stems are hard, thick, and woody, while herb stems are soft and green.
Trees typically have tall, hard, thick, brown, and woody stems, whereas herbs are characterized by their small size and soft, green stems.

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38. All of the following are mentioned as features that vary among different plants EXCEPT:
(A) Height of the plant.
(B) Shape and arrangement of leaves.
(C) Color and scent of flowers.
(D) The ability to perform photosynthesis.

Ans :

(D) The ability to perform photosynthesis.
While height, leaf characteristics, and flower attributes are discussed as varying features for grouping plants, the fundamental ability to perform photosynthesis is a common characteristic of most plants, not a primary basis for the initial groupings discussed.

39. If you find a plant with leaves that have veins running parallel to each other, what kind of root system would you generally expect it to have?
(A) Taproot system
(B) Fibrous root system
(C) A combination of taproot and fibrous roots
(D) No roots at all

Ans :

(B) Fibrous root system
There is a general correlation that plants with parallel venation in their leaves, like grasses and other monocots, typically have a fibrous root system.

40. **Assertion (A) :** The biodiversity of different regions varies.
Reason (R) : Different regions have distinct environmental conditions, and plants and animals possess adaptations to survive in those specific conditions.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
The variation in environmental factors across different regions (like deserts versus mountains) necessitates different survival strategies. Organisms develop specific adaptations to thrive in their particular habitats, leading to the observed differences in biodiversity.

41. What term is used to describe animals that can live both in water and on land?
(A) Aquatic animals
(B) Terrestrial animals
(C) Amphibians
(D) Arboreal animals

Ans :

(C) Amphibians
Animals, such as frogs, that are adapted to live and survive in both aquatic (water) and terrestrial (land) environments are classified as amphibians.

42. Which plant is mentioned as having a taproot system and reticulate venation, similar to sadabahar?
(A) Wheat
(B) Lemongrass
(C) Chickpea (chana)
(D) Maize

Ans :

(C) Chickpea (chana)
Chickpea (chana) is an example of a plant that has a taproot system and exhibits reticulate venation in its leaves—both features typical of dicot plants.

43. Why is it important to protect biodiversity?
(A) To ensure there are enough animals for zoos.
(B) To make sure our planet is full of life, helping plants and animals survive and thrive.
(C) Primarily to increase the number of plant species for human consumption.
(D) To prevent animals from migrating to new habitats.

Ans :

(B) To make sure our planet is full of life, helping plants and animals survive and thrive.
Protecting biodiversity is crucial for maintaining healthy ecosystems where diverse species can survive and flourish. This ensures ecological balance and the continuation of life in its varied forms on Earth.

44. What is the term for the method of arranging things into groups based on their common features?
(A) Adaptation
(B) Grouping
(C) Venation
(D) Habitat

Ans :

(B) Grouping

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Grouping, or classification, is the process of organizing or arranging items, including plants and animals, into distinct categories based on shared characteristics or common features. This simplifies study and understanding.

45. Which of these is NOT listed as an example of a terrestrial habitat?
(A) Forests
(B) Deserts
(C) Grasslands
(D) Ponds

Ans :

(D) Ponds
Ponds are listed as examples of aquatic habitats, which are environments where organisms live in water. Forests, deserts, and grasslands are examples of terrestrial (land-based) habitats.

46. What is a key difference in the humps of camels from hot deserts compared to those from cold deserts?
(A) Hot desert camels have no humps, cold desert camels have one.
(B) Hot desert camels have two humps, cold desert camels have one.
(C) Hot desert camels have one hump, cold desert camels have two humps.
(D) Both types of camels have the same number of humps.

Ans :

(C) Hot desert camels have one hump, cold desert camels have two humps.
Camels living in hot deserts usually have one hump to store food, while those in cold desert regions like Ladakh typically have two humps for the same purpose.

47. A student observes an animal that both flies and walks. Which of the following animals best fits this description of movement?
(A) Fish
(B) Goat
(C) Pigeon
(D) Ant

Ans :

(C) Pigeon
The pigeon as an animal that exhibits both flying and walking as types of movement, using its wings and legs respectively.

48. **Assertion (A) :** The streamlined body of a fish is an adaptation.
Reason (R) : This body shape helps the fish to swim efficiently in water.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
A fish's streamlined body is a specific feature (adaptation) that reduces water resistance, enabling it to move through water with greater ease and efficiency. This shows a direct link between the feature and its function for survival in its habitat.

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49. Consider the following plant characteristics:
1. Presence of taproots.
2. Leaves with parallel venation.
3. Seeds with two cotyledons.
Which of these characteristics are generally associated with dicot plants?
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(C) 1 and 3 only
Dicot plants are typically characterized by the presence of a taproot system and seeds that contain two cotyledons. Parallel venation is generally a feature of monocot plants.

50. A remote village community strictly prohibits the cutting of trees and harming animals within a specific forested area near their settlement, believing it to be sacred. This protected area is an example of a:
(A) National Park
(B) Sacred grove
(C) Botanical garden
(D) Commercial forest

Ans :

(B) Sacred grove
Sacred groves are patches of forest traditionally protected by local communities, often due to cultural or religious significance. The scenario

describes such a community-protected area where harming nature is disallowed, fitting the description of a sacred grove.

51. What is the main objective of a nature walk for students?
(A) To collect as many different plant specimens as possible.
(B) To identify and name all plants and animals encountered.
(C) To experience the beauty and variety of plants and animals in nature.
(D) To measure the height and width of the trees in the area.

Ans :

(C) To experience the beauty and variety of plants and animals in nature.
Dr. Raghu informed the students that the objective of the nature walk was to experience the beauty and variety of plants and animals present in their natural surroundings.

52. How does Maniram chacha's skill of mimicking bird calls contribute to the students' learning during the nature walk?
(A) It helps in scaring away other animals.
(B) It demonstrates an example of diversity in nature (unique bird chirps).
(C) It is primarily for entertainment purposes.
(D) It helps in attracting birds for closer observation.

Ans :

(B) It demonstrates an example of diversity in nature (unique bird chirps).
After Dr. Raghu mentioned that each bird has a unique chirp as an example of diversity, Maniram chacha mimicking different bird calls would further illustrate this diversity in bird vocalizations.

53. Plants that are not as tall as trees, often with many brown woody stems starting close to the ground, are called:
(A) Herbs
(B) Shrubs
(C) Creepers
(D) Climbers

Ans :

(B) Shrubs
Shrubs are defined as plants that are usually shorter than trees and have several hard, woody stems that branch out near the base.

54. What is a key difference in the stems of herbs versus shrubs?
(A) Herb stems are brown and woody; shrub stems are green and soft.
(B) Herb stems are soft and green; shrub stems are brown and woody (though not as thick as trees).
(C) Herbs have a single main stem; shrubs have no stems.
(D) Herb stems branch high up; shrub stems branch near the ground.

Ans :

(B) Herb stems are soft and green; shrub stems are brown and woody (though not as thick as trees).
Herbs are characterized by soft, green, and tender stems, while shrubs typically have multiple brown, woody stems that are harder but not as thick as those of trees.

55. The several ways in which animals move. Which of the following is NOT specifically mentioned as a type of animal movement?
(A) Fly
(B) Crawl
(C) Hibernate
(D) Jump

Ans :

(C) Hibernate
The movements like flying, walking, jumping, and crawling. Hibernation is a state of inactivity and metabolic depression, not a method of locomotion.

56. A student finds a plant with a single main root from which smaller roots are growing. Its leaves show a net-like vein pattern. This plant is most likely a:
(A) Monocot with parallel venation.
(B) Dicot with reticulate venation.
(C) Monocot with reticulate venation.
(D) Dicot with parallel venation.

Ans :

(B) Dicot with reticulate venation.
A single main root (taproot) and net-like leaf venation (reticulate venation) are characteristic features generally associated with dicotyledonous plants.

57. **Assertion (A) :** Camels living in cold deserts like Ladakh grow long hair from head to neck.
Reason (R) : This long hair is an adaptation that helps them survive the cold winter temperatures.

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(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
The growth of long hair on camels in cold deserts is a specific physical feature (adaptation). This thick coat of hair provides insulation, helping the animal to conserve body heat and survive the extremely cold temperatures of its habitat.

58. Which of the following statements are true regarding the grouping of plants?
1. Plants can be grouped based on the height and nature of their stem.
2. All plants with green leaves have parallel venation.
3. The number of cotyledons in a seed is a basis for grouping plants.

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(C) 1 and 3 only
Plants are grouped into herbs, shrubs, and trees based on stem characteristics and height. They are also grouped into monocots and dicots based on the number of cotyledons. Leaf venation type varies and is not solely determined by leaf color.

59. A farmer is growing wheat in his field. Wheat grains, when examined, show a single cotyledon. where the veins run alongside each other from base to tip.
What type of leaf venation and root system would the wheat plants likely exhibit?
(A) Reticulate venation and taproot system.
(B) Parallel venation and fibrous root system.
(C) Reticulate venation and fibrous root system.
(D) Parallel venation and taproot system.

Ans :

(B) Parallel venation and fibrous root system.
Wheat is a monocot (single cotyledon). Monocots generally have parallel venation in their leaves and a fibrous root system, which aligns with the scenario's observation.

60. The 'Cheetah Reintroduction Project' was initiated in India in which year?
(A) 1973
(B) 1987
(C) 2022
(D) 1997

Ans :

(C) 2022
The 'Cheetah Reintroduction Project' was launched in 2022 to help restore the population of cheetahs in India.

61. Why is it advised not to pluck leaves and flowers during a nature walk?
(A) Because they might be poisonous.
(B) To ensure they remain for others to observe and for their ecological role.
(C) Because it is difficult to carry them back.
(D) Because they wilt quickly after being plucked.

Ans :

(B) To ensure they remain for others to observe and for their ecological role.
Not plucking leaves and flowers during a nature walk is a way to respect nature, ensure that these parts of the plant remain for their natural functions (like photosynthesis or reproduction), and allow others to observe them.

62. Which term describes plants that typically have a main root from which smaller, side roots grow?
(A) Fibrous roots
(B) Taproot
(C) Adventitious roots
(D) Aerial roots

Ans :

(B) Taproot
A taproot is the main, central root of a plant from which lateral or side roots branch off. This is characteristic of a taproot system.

63. What kind of leaf venation is exhibited by the leaves of a banana plant?
(A) Reticulate venation
(B) Parallel venation
(C) Palmate venation
(D) Pinnate venation

Ans :

(B) Parallel venation
Banana plant leaves show parallel venation, with veins running side by side along the length of the leaf.

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64. What is the primary difference between terrestrial and aquatic habitats?
(A) Terrestrial habitats are always hot, and aquatic habitats are always cold.
(B) Terrestrial habitats are on land, and aquatic habitats are in water.
(C) Terrestrial habitats have only plants, and aquatic habitats have only animals.
(D) Terrestrial habitats are man-made, and aquatic habitats are natural.

Ans :

(B) Terrestrial habitats are on land, and aquatic habitats are in water.
The fundamental distinction is that terrestrial habitats are land-based environments (like forests, deserts), while aquatic habitats are water-based environments (like ponds, oceans).

65. All of the following are listed as examples of animals that have declined in India due to loss of natural habitats EXCEPT:
(A) Bengal Tiger
(B) Cheetah
(C) Great Indian Bustard
(D) Common Crow

Ans :

(D) Common Crow
The Bengal Tiger, Cheetah, and Great Indian Bustard are species whose populations have declined due to habitat loss. The common crow is not mentioned in this context.

66. If a plant has leaves with a net-like pattern of veins and its seeds can be split into two distinct halves, it is likely a:
(A) Monocot with fibrous roots.
(B) Dicot with taproots.
(C) Monocot with taproots.
(D) Dicot with fibrous roots.

Ans :

(B) Dicot with taproots.
Net-like (reticulate) venation and seeds with two halves (dicotyledonous) are characteristic features of dicot plants, which also typically have taproot systems.

67. **Assertion (A) :** Sacred groves are important for conserving biodiversity.
Reason (R) : Local communities protect these forest patches, preventing harm to plants and animals within them.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Sacred groves contribute to biodiversity conservation precisely because the protection provided by local communities restricts harmful activities like tree cutting and animal harm, allowing diverse species to thrive undisturbed.

68. Which of the following accurately describes characteristics of a typical tree?
1. It has a hard, thick, and woody stem.
2. Its branches usually start very close to the ground.
3. It is generally much taller than herbs and shrubs.

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(C) 1 and 3 only
Trees are characterized by tall stature and hard, thick, woody stems. Their branches typically originate higher up on the stem, unlike shrubs where branching is near the ground.

69. A scientist is studying a newly discovered plant. The plant's seeds have only one cotyledon. The leaves show veins that run parallel to the midrib. Based on these observations, the plant most likely has:
(A) A prominent taproot system.
(B) A fibrous root system.
(C) Thick storage roots like carrots.
(D) No true root system.

Ans :

(B) A fibrous root system.
Plants with seeds containing a single cotyledon (monocots) and leaves exhibiting parallel venation generally possess a fibrous root system.

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70. The 'Save Silent Valley' movement was primarily aimed at preventing the construction of what?
(A) A large industrial complex.
(B) A hydroelectric dam across the Kunthipuzha river.
(C) A new highway through the forest.
(D) A series of tourist resorts.

Ans :

(B) A hydroelectric dam across the Kunthipuzha river.
The Save Silent Valley movement was a significant effort to prevent the construction of a proposed hydroelectric dam across the Kunthipuzha river, which would have submerged a large area of the pristine forest.

71. How do the wide hooves of a camel living in a hot sandy desert provide an advantage?
(A) They help the camel to dig for water.
(B) They help the camel to walk on sand without sinking.
(C) They keep the camel cool by radiating excess heat.
(D) They are used for defense against predators.

Ans :

(B) They help the camel to walk on sand without sinking.
The wide hooves of a desert camel distribute its weight over a larger area of sand. This prevents the camel from sinking into the loose sand, making it easier to walk in its desert habitat.

72. What is the general term for the place where different types of plants and animals are found living together, sharing resources?
(A) Adaptation
(B) Habitat
(C) Venation
(D) Cotyledon

Ans :

(B) Habitat
A habitat is the natural home or environment of an organism, where it lives and finds the resources it needs like food, water, and shelter. Many different species can share the same habitat.

73. In the context of plants, what does "dicot" stand for?
(A) Having a single seed leaf.
(B) Having seeds with two cotyledons.
(C) Having a fibrous root system.
(D) Having leaves with parallel veins.

Ans :

(B) Having seeds with two cotyledons.
"Dicot" is short for dicotyledon, which refers to plants whose seeds have two embryonic leaves, or cotyledons.

74. How does the stem of a shrub typically differ from the stem of a tree?
(A) Shrub stems are soft and green, while tree stems are hard and woody.
(B) Shrub stems are generally thicker and taller than tree stems.
(C) Shrub stems are hard and woody but usually not as thick as tree stems, and they branch near the ground.
(D) Shrubs have a single main stem, while trees have multiple stems from the base.

Ans :

(C) Shrub stems are hard and woody but usually not as thick as tree stems, and they branch near the ground.
Shrubs have hard, woody stems like trees, but they are typically not as thick and tend to branch out closer to the ground level, unlike trees which usually have a main trunk with branches higher up.

75. Which of the following is NOT mentioned as a way animals move in Table?
(A) Walks
(B) Flies
(C) Swims
(D) Photosynthesizes

Ans :

(D) Photosynthesizes
The types of physical movement animals use for locomotion, such as walking, flying, and swimming (implied for fish). Photosynthesis is a process of food production in plants, not a type of animal movement.

76. If a plant exhibits parallel venation in its leaves and its seeds contain a single cotyledon, what type of root system is it most likely to possess?
(A) Taproot system
(B) Fibrous root system
(C) A deep main root with few branches
(D) Prop roots

Ans :

(B) Fibrous root system

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These characteristics – parallel venation and a single cotyledon – are typical of monocot plants, which generally have a fibrous root system.

77. **Assertion (A) :** The diversity of plants and animals varies from region to region.
Reason (R) : All regions on Earth have identical climatic conditions and resources.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(C) A is true, but R is false.
It is true that biodiversity varies across regions. However, the reason for this variation is the presence of diverse, not identical, climatic conditions and resources, to which organisms adapt.

78. Consider these features of plants:
1. Soft and green stems.
2. Typically small in size.
3. Hard, thick, brown, and woody stems.

Which of these features are characteristic of herbs?
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(A) 1 and 2 only
Herbs are generally small plants characterized by soft and green stems. Hard, thick, brown, and woody stems are features of trees and shrubs.

79. A group of students is studying a tall plant with a thick, woody main stem from which branches emerge high above the ground. Its leaves show a net-like pattern of veins.This plant would be classified as a:
(A) Herb with a taproot system.
(B) Shrub with a fibrous root system.
(C) Tree with a taproot system.
(D) Creeper with parallel venation.

Ans :

(C) Tree with a taproot system.
The description matches that of a tree (tall, thick woody stem, branches high up). Net-like venation suggests it's a dicot, which typically has a taproot system.

80. What is the primary role of the 'Cheetah Reintroduction Project' in India?
(A) To study the behavior of cheetahs in captivity.
(B) To train cheetahs for wildlife safaris.
(C) To restore the population of the Cheetah in India.
(D) To export cheetahs to other countries.

Ans :

(C) To restore the population of the Cheetah in India.
The 'Cheetah Reintroduction Project' was launched in India to restore the country's cheetah population, which had previously become extinct.

MATCHING TYPE QUESTION

81. Match the plant group in Column A with its characteristic feature in Column B:

	Column A		**Column B**
1.	Herbs	A.	Tall, with hard, thick, woody stem and branches higher up
2.	Shrubs	B.	Weak stems, need support to climb
3.	Trees	C.	Small plants with soft, green stems
4.	Climbers	D.	Medium height, hard woody stems branching near the ground

(a) 1-C, 2-D, 3-A, 4-B
(b) 1-D, 2-A, 3-C, 4-B
(c) 1-C, 2-A, 3-D, 4-B
(d) 1-B, 2-D, 3-A, 4-C

Ans :

(a) 1-C, 2-D, 3-A, 4-B

Herbs have soft, green stems. Shrubs are medium-sized with woody stems branching near the ground. Trees are tall with thick, woody stems. Climbers have weak stems needing support.

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82. Match the plant feature in Column A with its correct description in Column B:

	Column A		Column B
1.	Reticulate Venation	A.	Roots are like a bunch from the stem base (e.g., Grass)
2.	Parallel Venation	B.	Main root with smaller side roots (e.g., Mustard)
3.	Taproot System	C.	Veins form a net-like pattern (e.g., Hibiscus leaf)
4.	Fibrous Root System	D.	Veins run parallel on the leaf (e.g., Banana leaf)

(a) 1-D, 2-C, 3-A, 4-B
(b) 1-C, 2-D, 3-B, 4-A
(c) 1-C, 2-B, 3-D, 4-A
(d) 1-B, 2-D, 3-A, 4-C

Ans :

(b) 1-C, 2-D, 3-B, 4-A
Reticulate venation is a net-like vein pattern. Parallel venation has parallel veins. A taproot system has one main root. A fibrous root system has a bunch of roots.

83. Match the term related to animal diversity in Column A with its correct definition or example in Column B:

	Column A		Column B
1.	Habitat	A.	Animal that lives both on land and in water (e.g., Frog)
2.	Adaptation	B.	Variety of plants and animals in a region
3.	Biodiversity	C.	Special features enabling survival in a particular region (e.g., Camel's hump)
4.	Amphibian	D.	The natural place where a plant or animal lives

(a) 1-C, 2-D, 3-A, 4-B
(b) 1-D, 2-A, 3-B, 4-C
(c) 1-B, 2-C, 3-D, 4-A
(d) 1-D, 2-C, 3-B, 4-A

Ans :

(d) 1-D, 2-C, 3-B, 4-A
Habitat is an organism's natural home. Adaptation refers to special survival features. Biodiversity is the variety of life. Amphibians live both on land and in water.

84. Match the animal adaptation in Column A with the environment it is suited for or its function in Column B:

	Column A		Column B
1.	Thick fleshy stem of Cactus	A.	Helps fish swim in water
2.	Sloping branches of Deodar tree	B.	Helps camels survive food scarcity in deserts
3.	Streamlined body and fins	C.	Allows snow to slide off easily in mountain
4.	Camel's hump(s)	D.	Stores water, helps survive in hot deserts

(a) 1-D, 2-C, 3-A, 4-B
(b) 1-A, 2-B, 3-D, 4-C
(c) 1-D, 2-A, 3-C, 4-B
(d) 1-B, 2-C, 3-A, 4-D

Ans :

(a) 1-D, 2-C, 3-A, 4-B
Cactus stems store water. Sloping branches of deodars shed snow. Streamlined bodies and fins aid fish swimming. Camel humps store fat for energy during food scarcity.

VERY SHORT QUESTION

85. Who were invited to the school by Madam Sulekha for a nature walk?

Ans :

Dr Raghu and Maniram chacha.

86. What is Maniram chacha an expert in, related to birds?

Ans :

Mimicking bird calls.

87. What was the stated objective of the nature walk for the students?

Ans :

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To experience the beauty and variety of plants and animals in nature.

88. What did Dr Raghu inform the students about each bird's chirp?

Ans :

Each bird has a unique chirp.

89. What term is used for the variety of plants and animals found in a particular region?

Ans :

Biodiversity.

90. Are plants and animals dependent on each other according to the chapter?

Ans :

Yes.

91. What is the general term for plants that are typically small with soft and green stems?

Ans :

Herbs.

92. What is the pattern of veins on a leaf called?

Ans :

Venation.

93. What type of venation has a net-like pattern on both sides of a thick middle vein?

Ans :

Reticulate venation.

94. What type of roots appear as a bunch of similar-sized thin roots from the base of the stem?

Ans :

Fibrous roots.

95. Generally, what type of roots do plants with reticulate venation have?

Ans :

Taproots.

96. How many cotyledons do dicotyledon (dicot) plants have in their seeds?

Ans :

Two cotyledons.

97. What type of root system do monocot plants generally have?

Ans :

Fibrous root system.

98. Who was Janaki Ammal?

Ans :

An Indian botanist.

99. What are the special features that enable plants and animals to survive in a particular region called?

Ans :

Adaptations.

100. What is the place where plants and animals live called?

Ans :

Habitat.

101. Give one example of a terrestrial habitat mentioned in the chapter.

Ans :

Forests (or deserts, grasslands, mountains).

102. What are animals called that can live both in water and on land?

Ans :

Amphibians.

103. What was the name of the project initiated in 1973 to protect the Bengal Tiger?

Ans :

Project Tiger.

104. What are traditionally protected patches of forests, guarded by local communities, called?

Ans :

Sacred groves.

SHORT ANSWER QUESTION

105. What advice did Dr Raghu give the students about observing living creatures during the nature walk?

Ans :

Dr Raghu advised students to notice the variety of smells and emphasized respecting all

living creatures, observing them without any disturbance.

106. List three ways plants can vary as observed by the students.

Ans :

Plants can vary by being tall/short with hard/ soft stems, having different leaf shapes and arrangements, and flowers varying in color, shape, and scent.

107. How do animals depend on plants, and plants on animals? Give one example for each.

Ans :

Trees provide food and shelter to animals; animals help in spreading seeds after eating fruits, showing mutual dependence for survival and propagation.

108. Why is grouping plants and animals important ?

Ans :

Grouping plants and animals based on their similarities and differences makes it easier to understand and study their vast diversity systematically.

109. Describe the main characteristics of shrubs as per the chapter.

Ans :

Shrubs are not as tall as trees, often have many brown woody stems branching close to the ground, which are hard but not very thick.

110. What is the difference between climbers and creepers?

Ans :

Climbers are plants with weak stems that need support to climb and grow upwards, while creepers are plants that spread along the ground.

111. Explain parallel venation with an example given in the chapter.

Ans :

In parallel venation, the veins on a leaf run parallel to each other. For example, the leaves of banana plants and grasses exhibit this pattern.

112. What is a taproot system? Give an example of a plant with a taproot.

Ans :

A taproot system consists of one main root with smaller side roots arising from it. A mustard plant or hibiscus has a taproot system.

113. What is the general relationship between the number of cotyledons in a seed and its leaf venation type?

Ans :

Dicot plants, with two cotyledons, generally have reticulate venation, while monocot plants, with one cotyledon, generally have parallel venation in their leaves.

114. How did Janaki Ammal contribute to preserving India's plant biodiversity?

Ans :

Janaki Ammal documented and worked to preserve India's rich plant biodiversity and played a key role in the 'Save Silent Valley' movement.

115. What are two distinct features of deodar trees that help them survive in snowy mountains?

Ans :

Deodar trees are conical in shape and have flexible, sloping branches, which help them to let snow slide off easily in mountainous regions.

116. How do the fleshy stems of desert plants help them survive?

Ans :

The fleshy stems of desert plants, like cacti, can store water, which helps these plants tolerate and survive the hot and dry desert conditions.

117. Mention two differences between camels found in hot deserts and those in cold deserts.

Ans :

Hot desert camels have one hump and long legs, while cold desert camels have two humps and comparatively shorter legs with long hair.

118. How do camels in hot deserts conserve water?

Ans :

Camels in hot deserts conserve water by excreting small amounts of urine, having dry dung, and not sweating much, allowing survival without water for days.

119. Define "habitat" and provide an example from the chapter.

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Ans :

A habitat is the place where plants and animals live, providing them with food, water, air, and shelter. For example, a camel's habitat is the desert.

120. Differentiate between terrestrial and aquatic habitats, giving one example of each ?

Ans :

Terrestrial habitats are on land, like forests where lions live. Aquatic habitats are in water, like oceans where fish live.

121. Why has the population of the Bengal Tiger declined in India?

Ans :

The population of the Bengal Tiger has declined in India primarily due to the loss of its natural habitat caused by human activities.

122. What is a key characteristic of sacred groves that helps protect biodiversity?

Ans :

Sacred groves are protected by the local community, where no one is allowed to harm animals or cut trees, thus preserving them as community-protected biodiversity treasures.

123. What is the main consequence of damage to the habitats of plants and animals?

Ans :

Damage to habitats results in plants and animals losing their homes, food, and other resources, ultimately leading to a loss of biodiversity.

LONG ANSWER QUESTION

124. What was the purpose of a nature walk and what key instructions were given to the students to ensure a respectful and fruitful learning experience?

Ans :

The purpose of the nature walk was to help students experience the beauty and variety of plants and animals in nature. Key instructions included carrying a notebook and pen for recording observations, noticing the variety of smells, respecting all living creatures by observing them without disturbance, carefully listening to different sounds, and not plucking leaves or flowers. This approach aimed to foster observation skills while instilling respect for nature and its biodiversity.

125. Explain the concept of biodiversity. Why is there variation in biodiversity from one region to another? Use examples of plants from different regions.

Ans :

Biodiversity refers to the variety of plants and animals found in a particular region. This variation exists because different regions have distinct environmental conditions. For instance, cactus plants with thick, fleshy stems are found in deserts to store scarce water, while deodar trees in cold mountains are conical with sloping branches to let snow slide off easily. Rhododendrons in the Nilgiris are shorter with smaller leaves to survive heavy winds, unlike taller ones in Sikkim. These adaptations to local conditions shape regional biodiversity.

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126. The grouping plants based on several characteristics. Describe how plants are classified into herbs, shrubs, and trees, highlighting the distinguishing features of each group.

Ans :

Plants are grouped into herbs, shrubs, and trees based on height and stem characteristics. Herbs are typically small with soft, green stems. Shrubs are medium-sized, not as tall as trees, often with multiple hard, woody brown stems that branch near the ground but aren't very thick. Trees are tall plants with hard, thick, brown woody stems, and their branches usually start higher up on the stem, away from the ground. This classification helps in understanding plant diversity.

127. Explain the two main types of leaf venation discussed in the chapter: reticulate and parallel. Provide an example for each type.

Ans :

Leaf venation is the pattern of veins on a leaf. Reticulate venation shows a net-like pattern of veins on both sides of a thick middle vein; for example, hibiscus leaves exhibit this. Parallel venation is where the veins run parallel to each other along the length of the leaf; examples include the leaves of banana plants and grasses.

Observing venation is one way to group and identify different types of plants and understand their structural diversity.

128. Describe the two primary types of root systems found in plants – taproot and fibrous root. What is the general correlation observed between root type and leaf venation?

Ans :

A taproot system consists of one main, prominent root with smaller, lateral roots branching off it, like in a mustard plant. A fibrous root system appears as a bunch of many thin, similar-sized roots arising from the base of the stem, as seen in common grass. Generally, plants exhibiting reticulate leaf venation, such as hibiscus or chickpea, tend to have taproots, while those with parallel leaf venation, like lemongrass or wheat, usually possess fibrous roots.

129. What are monocotyledonous (monocot) and dicotyledonous (dicot) plants? Explain the key differences between them based on seeds, leaf venation, and root systems.

Ans :

Plants are classified as monocots or dicots based on the number of cotyledons in their seeds. Dicot plants have seeds with two cotyledons (e.g., chickpea), typically exhibit reticulate leaf venation, and possess a taproot system. Monocot plants have seeds with a single cotyledon (e.g., maize), generally show parallel leaf venation, and have a fibrous root system. These correlated features help in the broad classification of flowering plants.

130. Define "adaptations" in the context of plants and animals. Provide two specific examples of animal adaptations from the chapter, explaining how each feature helps the animal survive in its particular habitat.

Ans :

Adaptations are special features that enable plants and animals to survive in a particular region or habitat. For example, fish have streamlined bodies and fins which are adaptations for easy movement in their aquatic habitat. Camels in hot deserts have long legs with wide hooves to walk on sand without sinking, and they can store food in humps and conserve water, which are crucial adaptations for survival in arid conditions with scarce resources.

131. What does a habitat provide to plants and animals? What are the consequences of habitat damage, and why is it crucial to protect biodiversity?

Ans :

A habitat is the natural living place of plants and animals, providing them with essential needs like food, water, air, and shelter for their survival. Damage to habitats, often due to human activities, leads to the loss of these resources, causing displacement or death of organisms and ultimately resulting in a loss of biodiversity. Protecting biodiversity is crucial to ensure our planet remains full of life, allowing diverse species to survive, thrive, and maintain ecological balance.

132. Discuss the "Save Silent Valley Movement" as a success story. What was the issue, and how did people contribute to the conservation effort described ?

Ans :

The "Save Silent Valley Movement" successfully preserved a moist evergreen forest in Kerala, rich in biodiversity, from a proposed hydroelectric dam across the Kunthipuzha river. Common people, even those not residing nearby, led a decade-long battle. They used widespread awareness programs, letters to editors, newspaper articles, seminars, and legal petitions to voice their opposition. This collective public effort was instrumental in saving the Silent Valley and its unique ecosystem from destruction.

133. Who was Salim Ali, and what were his significant contributions to the understanding and conservation of bird diversity in India ?

Ans :

Salim Ali, known as the 'Birdman of India', was an ornithologist who travelled extensively across India to observe bird diversity. He meticulously prepared lists of birds, documented their travel routes and habitats, and identified regions with high bird diversity. Crucially, he took measures to conserve these regions, with Keoladeo National Park and Ranganathittu Bird Sanctuary being examples he helped preserve. His landmark series of 10 books on Indian subcontinent birds also significantly contributed to ornithology.

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CASE BASED QUESTION

134. A group of students observed two different types of plants in their school garden. Plant A was short with a soft, green stem and leaves showing veins running parallel to each other. Plant B was much taller, with a hard, thick, woody brown stem, and its leaves had a net-like pattern of veins. They also found some seeds near Plant B which, when opened, split into two parts.

(i) Based on the stem characteristics, classify Plant A and Plant B.

(ii) What type of leaf venation does Plant A likely have? What about Plant B?

(iii) Based on the seed structure found near Plant B and its leaf venation, what type of root system would Plant B most likely possess?

(iv) If Plant A is a type of grass, would its root system more likely be taproot or fibrous? Explain.

Ans :

(i) Plant A, being short with a soft, green stem, is likely a herb. Plant B, being tall with a hard, thick, woody brown stem, is a tree.

(ii) Plant A, with veins running parallel, has parallel venation. Plant B, with a net-like pattern of veins, has reticulate venation.

(iii) Plant B's seeds split into two parts (dicot), and its leaves have reticulate venation. Therefore, Plant B would most likely possess a taproot system.

(iv) If Plant A is a type of grass (which typically has parallel venation), it would more likely have a fibrous root system, as monocots generally have parallel venation and fibrous roots.

135. In a documentary, students saw camels surviving in the extremely hot desert of Rajasthan and also different camels in the cold, mountainous desert of Ladakh. The narrator explained that the features of these camels help them live in their respective environments. For instance, the Rajasthan camel has very long legs and one hump, while the Ladakh camel has shorter legs and two humps.

(i) What is the general term for features that help animals survive in their specific environments?

(ii) How do the long legs of the Rajasthan camel likely help it in the hot sandy desert?

(iii) Why might the Ladakh camel benefit from having two humps compared to the single hump of the Rajasthan camel, considering food availability?

(iv) Besides leg length and number of humps, suggest one other physical adaptation a Ladakh camel might have for cold conditions, based on the chapter's information.

Ans :

(i) The general term for features that help animals survive in their specific environments is adaptations.

(ii) The long legs of the Rajasthan camel, along with wide hooves, help it walk on the sandy desert without sinking into the sand and keep its body further from the hot ground.

(iii) Camels store food in their humps. Having two humps might provide the Ladakh camel with a larger food reserve, which is beneficial as food can be very scarce in the cold desert, especially during late winters when these humps shrink.

(iv) The Ladakh camel grows long hair from head to neck, which is an adaptation to help it survive the extreme cold winters of its mountainous desert habitat.

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136. A science class was studying biodiversity. The teacher displayed pictures of a fish, a frog, and a squirrel. She asked students to think about where these animals live and how they are suited to their surroundings. The fish was shown swimming in water, the frog near a pond, and the squirrel on a tree.

(i) Classify the habitats of the fish and the squirrel as either terrestrial or aquatic.

(ii) What term is used for animals like frogs that can live both in water and on land?

(iii) What features does a fish possess that are adaptations for living in water, as mentioned in the chapter?

(iv) Why is it important that these different animals live in habitats suited to their features?

Ans :

(i) The fish's habitat (water) is aquatic. The squirrel's habitat (on a tree/land) is terrestrial.

(ii) Animals like frogs that can live both in water and on land are called amphibians.

(iii) Fish have streamlined bodies and fins, which are adaptations that help them to swim and move efficiently in water.

(iv) It is important because their specific features (adaptations) are tailored for survival in those particular environments, providing them with food, shelter, and the means to reproduce successfully.

137. Students were discussing Project Tiger. They learned it was initiated because the Bengal Tiger population was declining due to habitat loss. Their teacher explained that many such projects are needed because when habitats are damaged, it affects not just one species but the entire variety of life in that area.

(i) What was the primary reason for the decline in the Bengal Tiger population that led to "Project Tiger"?
(ii) What is the term for the variety of life in a particular area?
(iii) According to the chapter, what does damage to habitats lead to for plants and animals?
(iv) Why is protecting habitats crucial for maintaining biodiversity?

Ans :

(i) The primary reason for the decline in the Bengal Tiger population was the loss of its natural habitat due to human activities.
(ii) The term for the variety of life in a particular area is biodiversity.
(iii) Damage to habitats leads to plants and animals losing their homes, food, and other essential resources for survival.
(iv) Protecting habitats is crucial because habitats provide everything plants and animals need to survive; without healthy habitats, species cannot thrive, leading to a reduction in the overall variety of life.

138. During a lesson on plant classification, a teacher showed students a chickpea seed that could be split into two parts and a maize seed that was a single unit. She then showed them the leaves of a chickpea plant which had a net-like vein pattern, and maize leaves which had veins running side-by-side.

(i) Based on its seed structure, is a chickpea plant a monocot or a dicot?
(ii) What type of leaf venation is characteristic of the chickpea plant, according to the observation?
(iii) Based on its seed structure (single unit), what type of leaf venation would you expect a maize plant to have?
(iv) What type of root system is generally associated with plants like chickpea (dicot with reticulate venation)?

Ans :

(i) A chickpea seed splits into two parts (cotyledons), so a chickpea plant is a dicotyledon (dicot).
(ii) The chickpea plant, with a net-like vein pattern, exhibits reticulate venation. (Implied by "net-like")
(iii) A maize seed is a single unit (monocot), so you would expect a maize plant to have parallel leaf venation.
(iv) Plants like chickpea (dicots with reticulate venation) are generally associated with a taproot system.

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CHAPTER 3

MINDFUL EATING : A PATH TO A HEALTHY BODY

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SUMMARY

1. WHAT DO WE EAT?

1.1 Food's Importance

Food is essential for life, providing sustenance to living beings. Being healthy involves eating wholesome food in moderation, suitable for the season and place.

1.2 Diversity in Diet

People eat a variety of foods daily. Food choices vary significantly across different states in India, often linked to locally grown crops, climate, culture, and traditions.

1.3 Evolution of Cooking

Cooking practices have changed over time due to factors like technology. Traditional methods (like chulhas, sil-battas) have often been replaced by modern ones (gas stoves, electric grinders).

2. WHAT ARE THE COMPONENTS OF FOOD?

2.1 Nutrients Defined

Food contains components called nutrients, which provide energy, support growth, repair the body, and protect from diseases. Major nutrients are carbohydrates, fats, proteins, vitamins, and minerals. Dietary fibre and water are also vital.

2.2 Energy-Giving Foods

(i) Carbohydrates : A primary energy source. Found in cereals, potatoes, fruits, etc.. Glucose offers instant energy.
(ii) Fats : Provide stored energy and warmth. Sources include oils, ghee, nuts, seeds, and butter.

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2.3 Body-Building Foods

Proteins : Essential for body growth and repair. Sources include pulses, beans, nuts, milk products, eggs, fish, meat and edible mushrooms.

2.4 Protective Foods

(i) **Vitamins :** Needed in small amounts to protect from diseases and keep us healthy. Examples : Vitamin A (vision), C (healing), D (bone health). Deficiencies cause diseases like scurvy and rickets. Some can be lost during cooking.
(ii) **Minerals :** Required in small amounts. Examples : Calcium (bones), Iodine (prevents goitre), Iron (blood). Iodised salt prevents iodine deficiency.

2.5 Other Essential Components

(i) Dietary Fibre (Roughage) : Aids digestion and waste removal. Found in fruits, vegetables, whole grains.
(ii) Water : Essential for nutrient absorption and waste removal.

3. HOW TO TEST DIFFERENT COMPONENTS OF FOOD?

3.1 Simple Tests

Basic tests can detect key nutrients:
(i) Starch : Iodine solution turns blue-black.
(ii) Fats : Food leaves a translucent, oily patch on paper.
(iii) Proteins : Using copper sulphate and caustic soda solution turns the mixture violet.

3.2 Multiple Nutrients

Many foods contain more than one type of nutrient (e.g., peanuts have protein and fat).

4. BALANCED DIET

A diet with all essential nutrients, roughage, and water in the right amounts for health and growth. Nutritional needs vary based on age, activity, etc..

4.1 Deficiency Diseases

Prolonged lack of nutrients leads to deficiency diseases.

4.2 Junk Food

Unhealthy foods high in calories (sugar/fat) but low in essential nutrients. Frequent consumption can lead to obesity and health issues. Packaged foods should have nutrient labels; some are fortified to improve nutritional quality. FSSAI regulates food quality in India.

5. MILLETS : NUTRITION-RICH CEREALS

Millets (e.g., jowar, bajra, ragi) are highly nutritious small grains. They are good sources of vitamins, minerals (iron, calcium), and dietary fibre. They contribute significantly to a balanced diet and are easily cultivated in India.

6. FOOD MILES : FROM FARM TO OUR PLATE

1. Food's Journey : Describes the process food undergoes from farm production to reaching the consumer's plate.
2. Food Miles Defined : The total distance food travels from producer to consumer.
3. Reducing Food Miles : Important to cut transport costs/pollution, support local farmers, and ensure food freshness. Eating local food helps.
4. Food Wastage : Highlights the effort in food production and stresses the importance of not wasting food by taking only what one can consume.

NCERT ACTIVITY

Activity 3.1 : Let us record

All of us eat food every day. Food is an essential component of our daily life. List the food items you have consumed over the week in Table.

Table : Food items consumed over a week

Day	Food items
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	

The table provided in the image is meant for the user to fill in based on their personal food consumption over a week. Since the table in the image is blank, there is no specific provided in the source material.

To complete the activity, you would fill in the food items you ate each day. For example:

Day	Food items
Monday	Roti, Dal, Mixed Vegetables, Rice
Tuesday	Poha, Fruit Salad, Chapati, Paneer Curry

Activity 3.2 : Let us explore

1. Find out the types of food traditionally consumed and the crops grown in various states of India.
2. You may refer to books in your library, search the internet, and interact with your friends, family and neighbours to collect information.
3. In Table, add more states and fill the collected data. A few examples are already given.

Table : Some traditional food items in various states of India

State	Locally grown crops	Traditional food items	Beverages
Punjab	Maize, wheat, chickpea, pulses	Makki di roti, sarson da saag, chhole bhature, parantha, halwa, kheer	Lassi, chhach (buttermilk), milk, tea
Karnataka	Rice, ragi, urad, coconut	Idli, dosa, sambhar, coconut chutney, ragi mudde, palya, rasam, rice	Buttermilk, coffee, tea
Manipur	Rice, bamboo, soya bean	Rice, eromba (chutney), utti (yellow peas and green onion curry), singju, kangsoi	Black Tea
Any other			

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Follow-up questions:

(i) Why do we see diversity in traditional food consumed in various states of our country?

Ans :

1. Weather and Soil : India is huge Some places are hot and dry (like Rajasthan), some get lots of rain (like West Bengal), some are mountains, and some are near the sea. Different plants grow well in different conditions. For example, rice needs lots of water, so it's common where it rains more. Bajra grows well in drier places.
2. People traditionally eat the crops that grow easily near their homes. If coconut trees grow well, like in Tamil Nadu or Karnataka, people use a lot of coconut in their food.
3. People in different parts of India have their own special ways of cooking and unique recipes passed down from their grandparents. These are their customs and traditions, which make their food special.

(ii) Analyse the data collected by you in Table . Are there food items that are common across states? Make a list of those food items.

Ans :

Even with all the differences, some foods are popular in many places:

1. Rice : Lots of people eat rice (like in West Bengal, Tamil Nadu, Karnataka, Manipur).
2. Dal (Lentils) : Many states have their own way of making dal or sambar (like Punjab, Rajasthan, Karnataka, Tamil Nadu).
3. Tea : Many people across India drink tea.
4. Flatbreads : While they have different names (Roti, Chapati, Bhakri, Parantha), many people eat flatbreads made from grains like wheat, bajra, or maize.

(iii) You may find that some food items are common in many states while some are eaten only in a particular state.

Ans :

Yes! That's exactly right.
Things like rice or dal are eaten in many states, but how they are cooked can be very different. But some dishes are really special to just one place. For example:

1. Dal Baati Churma is famous in Rajasthan.
2. Dosa and Idli are famous in South India (like Tamil Nadu and Karnataka).
3. Sarson da Saag is special to Punjab.
4. Rasgulla is a famous sweet from West Bengal.

So, India has a mix of common foods and very special local dishes because of its different climates, crops, and traditions!

Activity 3.3 : Let us interact and find out

1. Prepare a list of questions to ask elderly people about their food habits and cooking practices, comparing the past with the present.
2. Some sample questions you could use are:
   (i) What kind of food from your younger days do you still eat, and what new foods do you eat now?
   (ii) How have the ways of cooking changed over time? (e.g., stoves, utensils)
   (iii) What do you think caused these changes?
3. Interview some elderly people using the questions you prepared.

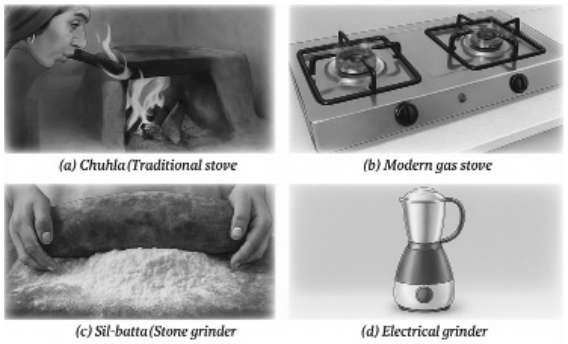

Figure : Change in cooking tools over time

Ans :

Cooking practices (also called culinary practices) have changed significantly over time.

Changes in Cooking:

1. Past : Most cooking was done using traditional methods like a chulha.
2. Present : Most people now use a modern gas stove.

Changes in Grinding:

1. Past : Grinding spices and other food items was done by hand using tools like a sil-batta.
2. Present : Electrical grinders are commonly used now for convenience and speed.

Other ways of cooking/grinding

The activity encourages finding out about other traditional methods as well (e.g., different types of stoves, hand-pounding tools).

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Reasons for Changes:

These changes in culinary practices over time might have happened because of:

1. Technological development : New inventions like gas stoves and electric mixers/grinders became available.
2. Improved transportation : Easier movement of goods (like LPG cylinders) and people.
3. Better communication : Spreading awareness of new methods and technologies.

Activity 3.4 : Let us conduct a survey

1. Study the Chart (Figure) : Learn about the functions, sources, deficiency diseases, and symptoms related to various vitamins and minerals listed in the chart below. Find out more sources if possible.
2. Conduct a Survey : Visit your neighborhood and talk to people. See if anyone shows symptoms mentioned in the chart. (This should be done carefully, possibly as a project guided by a teacher).
3. Analyze : If you observe any symptoms, try to relate them to the person's diet and identify a possible deficiency disease based on the chart.
4. Suggest : Think about what might be causing the symptoms and what dietary changes could help improve the situation.
5. Advise : Recommend that the person visit a doctor for proper diagnosis and advice.

Reference Information (Answer Key) from Figure : Chart of vitamins and minerals

Food Component (Vitamin/ Mineral)	**Functions**	**Some Sources**	**Deficiency Disease/ Disorder**	**Symptoms**
Vitamin A	Keeps eyes and skin healthy	Papaya, carrot, mango, milk	Loss of vision	Poor vision, loss of vision in darkness (night blindness), sometimes complete loss of vision
Vitamin B_1	Keeps heart healthy, supports nerve & muscle functions	Legumes, nuts, whole grains, eggs, milk products	Beriberi	Swelling, numbness, or tingling/burning sensation in feet and hands, trouble breathing
Vitamin C	Helps body to fight diseases	Amla, guava, green chilli, orange, lemon	Scurvy	Bleeding gums, slow healing of wounds
Vitamin D	Helps body absorb calcium for bone & teeth health	Exposure to sunlight, milk, butter, fish, egg	Rickets	Soft and bent bones
Calcium	Keeps bones and teeth healthy	Milk, soya milk, curd, cheese, paneer	Bone and tooth decay	Weak bones, tooth decay
Iodine	Helps to perform physical & mental activities	Seaweed, iodised salt (namak/salt), seafood	Goitre	Swelling at the front of the neck (thyroid gland)
Iron	Important component of blood	Green leafy vegetables, apple, pomegranate	Anaemia	Weakness, shortness of breath

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Ans :

For example, if you found someone often feeling weak and tired (symptoms) and learned they rarely eat green vegetables (potential cause/lack of source), you might suspect Anaemia (Iron deficiency) based on the chart, suggest they eat

more iron-rich foods, and advise them to see a doctor.

Activity 3.5 : Let us investigate

1. Take a small quantity of the food items such as a slice of potato, cucumber, bread, some boiled rice, boiled gram, crushed peanuts, oil, butter and crushed coconut. You can take other food items too for testing.

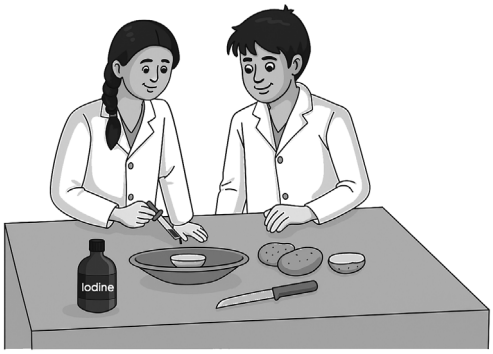

Figure : Testing for the presence of starch in various food items

2. Place a small piece of each item on a separate dish.
3. With the help of a dropper, put 2-3 drops of diluted iodine solution on each food item (Figure).
4. Observe if there are any changes in the colour of the food items. Have they turned blue-black? Record your observations in Table.

A blue-black colour indicates the presence of starch.

Ans :

When you add the iodine solution:

1. Potato : Will turn blue-black (indicates starch).
2. Cucumber : Will not turn blue-black (indicates no starch).
3. Bread : Will turn blue-black (indicates starch).
4. Boiled Rice : Will turn blue-black (indicates starch).
5. Boiled Gram : Might turn slightly blue-black (indicates some starch).
6. Crushed Peanuts : Will not turn blue-black (indicates no starch).
7. Oil : Will not turn blue-black (indicates no starch).
8. Butter : Will not turn blue-black (indicates no starch).
9. Crushed Coconut : Will not turn blue-black (indicates no starch).

Activity 3.6 : Let us investigate (Test for Fats)

1. Take a small part of the food items that you tested for the presence of starch in Activity 3.5.
2. Place each food item on a separate piece of paper.
3. Wrap the paper around the food and press it. Be careful not to tear the paper.
4. If a food item contains a little water, allow the paper to dry.

Does the paper develop an oily patch? What do you think is the reason for this patch? If oil or butter is present in the food item, it leaves an oily patch on the paper. Now, hold the paper against light. Can you see the light faintly shining through this patch? An oily patch on the paper shows that the food item contains fat. Which of these items contain fats?

Ans :

This test checks for fats by seeing if the food leaves a lasting oily, translucent patch on paper. Using the food items from Activity 3.5:

1. Potato : No oily patch expected (mostly starch).
2. Cucumber : No oily patch expected (mostly water; any wet patch will dry).
3. Bread : No oily patch expected (mostly starch).
4. Boiled Rice : No oily patch expected (mostly starch; any wet patch will dry).
5. Boiled Gram : No oily patch expected (mostly protein/carbs).
6. Crushed Peanuts : Yes, an oily patch is expected (contains fat).
7. Oil : Yes, an oily patch is expected (is fat).
8. Butter : Yes, an oily patch is expected (is fat).
9. Crushed Coconut : Yes, an oily patch is expected (contains fat).

So, the items expected to show the presence of fat in this test are crushed peanuts, oil, butter, and crushed coconut

Activity 3.7 : Let us investigate (Test for Protein)

(**Note :** This activity may be demonstrated by the teacher.)

1. Take the food items tested in previous activities.
2. Make a paste or powder of the food item using pestle and mortar (Figure).

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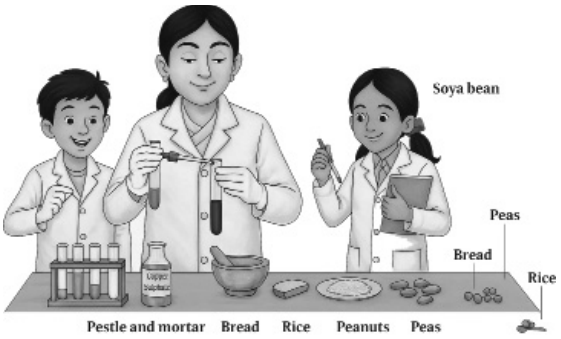

Figure : Testing for the presence of protein in various food items

3. Put about half teaspoon of each food item in a separate clean test tube.
4. Add 2-3 teaspoons of water to each test tube and shake them well.
5. Add two drops of copper sulphate solution to each test tube using a dropper.
6. Now, take another dropper and add 10 drops of caustic soda solution to each tube (Figure).
7. Shake well and leave the test tubes undisturbed for a few minutes.

Observation

What did you observe? Did the content of some test tubes turn violet? This violet colour indicates the presence of protein in the food item.

Analysis Questions :

Which food items contain protein? [See analysis questions in the image regarding combined results for starch, fat, protein from Table]

Ans :

Table : Exploring nutrients present in various food items

Name of the food item	**Colour for starch test (Iodine)**	**Oily patch for fat test (Paper)**	**Colour for protein test ($CuSO_4$ + NaOH)**	**Starch Present**	**Fat Present**	**Protein Present**
(After test)	(Yes/No)	(After test)	(Yes/No)	(Yes / No)	(Yes / No)	(Yes /No)
Potato	Blue-black	No	No violet	Yes	No	No
Cucum ber	No change (Brownish-yellow)	No	No violet	No	No	No
Bread	Blue-black	No	No violet	Yes	No	No
Boiled Rice	Blue-black	No	No violet	Yes	No	No
Boiled Gram	Slight Blue-black	No	Violet	Yes	No	Yes
Crushed Peanuts	No change (Brownish-yellow)	Yes	Violet	No	Yes	Yes
Oil	No change (Brownish-yellow)	Yes	No violet	No	Yes	No
Butter	No change (Brownish-yellow)	Yes	No violet	No	Yes	No
Crushed Coconut	No change (Brownish-yellow)	Yes	No violet	No	Yes	No
Soya bean (paste)	Slight Blue-black	Yes	Violet	Yes	Yes	Yes

Activity 3.8 : Let us find out

You have listed food consumed by you during the week in Activity 3.1. Check whether your food contains all the nutrients and other essential components necessary for growth and development. If not, check which nutrients or other food components need to be added.

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A diet that has all essential nutrients, roughage, and water in the right amount for proper growth and development of the body is known as a balanced diet. What changes would you make in your diet to make it a balanced diet?

Ans :

This activity asks you to analyze your own diet that you recorded in Activity 3.1 and figure out how to make it a balanced diet. Since I don't know what you listed in Activity 3.1, I can't give you your specific , but here's how you can find it:

Steps to Answer:

1. Look at your food list from Activity 3.1 : Review all the meals and snacks you ate throughout the week.
2. Analyze for Nutrients : Think about the main components in the foods you ate. Ask yourself:
   (i) Did I eat foods rich in Carbohydrates (like roti, rice, bread, potato for energy)?
   (ii) Did I eat enough foods rich in Proteins (like dal, gram, milk, curd, paneer, soya bean, eggs for growth)?
   (iii) Did I include sources of Fats (like oil, ghee, butter, nuts for energy and other functions)?
   (iv) Did I eat foods rich in Vitamins and Minerals (like fruits, green leafy vegetables, other colorful vegetables, milk)? Use the chart from Activity 3.4 to help remember sources.
   (v) Did I eat foods with Roughage/Fiber (like whole grains, fruits, vegetables, salads)?
   (vi) Did I drink enough Water?
3. Identify Missing Components : Based on your analysis, did you miss out on any major food groups or nutrients regularly? For example, did you hardly eat any fruits? Or maybe not enough protein sources?
4. Suggest Changes : Think about specific, realistic changes you could make. What foods could you add or eat more of? What could you eat less of if it's unhealthy?

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Activity 3.9 : Let us compare

Read the nutritional information given below for a packet of potato wafers and a packet of roasted chana shown here.

(a) Potato wafers

(b) Roasted chana

Nutritional Information (per 100 g):

Nutrient	Potato Wafers (a)	Roasted Chana (b)
Energy (kcal)	556	353
Fats (g)	33.0	6.26
Carbohydrates (g)	53.0	38.58
Proteins (g)	7.0	18.64
Dietary Fibre (g)	4.8	16.8

Question :

(i) Based on the nutritional information on the food packets given above, which food would you choose? Why?
(ii) Which of the two foods you studied in Activity 3.9 could be labelled as junk food?

Ans :

(i) Potato wafers are much higher in calories (Energy) and fats compared to roasted chana. Roasted chana is significantly higher in proteins and dietary fibre compared to potato wafers.
Choice : Roasted Chana.
Why : Roasted chana is the healthier choice. It provides substantial amounts of protein and dietary fiber while being much lower in fat and overall calories compared to potato wafers. Protein helps in growth and repair, and fiber aids digestion. Potato wafers, being very high in fat and calories but relatively low in protein and fiber, offer less nutritional benefit and align more closely with the description of junk food provided.
(ii) Based on the nutritional comparison and the definition provided, the Potato Wafers could be labelled as junk food due to their high fat, high calorie content, and relatively low protein and fiber compared to the healthier alternative.

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NCERT EXERCISE

1. Pick the odd one out and give reasons:
   (i) Jowar, Bajra, Ragi, Chana
   (ii) Kidney beans, Green gram, Soya bean, Rice

   Ans :

   (i) Odd one out : Chana
   Reason : Jowar, Bajra, and Ragi are types of millets (cereals), which are primarily sources of carbohydrates. Chana (chickpea) is a pulse (legume), which is a rich source of protein.
   (ii) Odd one out : Rice
   Reason : Kidney beans (Rajma), Green gram (Moong) and Soya bean are pulses or legumes, known for their high protein content. Rice is a cereal, which is primarily a source of carbohydrates.

2. Discuss traditional versus modern culinary practices in India.

   Ans :

   Traditional Culinary Practices : These methods often emphasize using fresh, local, and seasonal ingredients. Cooking techniques might include slow cooking over fire, grinding spices by hand using a mortar and pestle, fermentation (like for idli or dosa), and using traditional cookware like earthen pots or iron kadhais. Meals are often balanced based on regional traditions or Ayurvedic principles. These methods can be time-consuming but often preserve nutrients well and use less processed ingredients.

   Modern Culinary Practices : These often prioritize speed and convenience. They involve using pressure cookers, microwave ovens, mixers/grinders, and non-stick cookware. There's a greater reliance on processed foods, packaged ingredients, ready-made spice mixes, and frozen items. Refrigeration is common for storage. Modern practices also show influences from global cuisines and include fast food and ready-to-eat meals. While convenient, these practices may involve higher consumption of preservatives, unhealthy fats, sugar, and salt, and potentially lower nutrient retention in some processed foods.

3. A teacher says that good food may act as medicine. Ravi is curious about this statement and has some questions for his teacher. List at least two questions that he can ask.

   Ans :

   Ravi could ask questions like:
   How can eating specific foods help our body fight diseases or recover from illness?
   Can you give examples of foods that are known to have medicinal properties and what health benefits they provide?

4. Not all delicious foods are necessarily healthy, while not all nutritious foods are always enjoyable. Share your thoughts along with a few examples.

   Ans :

   Thoughts : It's true that taste and health don't always go hand-in-hand. Many foods engineered to be delicious (like chips, sugary drinks, candies, pizza, fried snacks) are high in sugar, salt, unhealthy fats, and refined flour, offering minimal nutrition and potentially harming health if eaten often. Conversely, some highly nutritious foods (like bitter gourd/karela, spinach for some, plain oats) might not appeal to everyone's taste initially. The goal should be balance : make healthy foods tastier (using spices, varied cooking methods) and enjoy less healthy 'delicious' foods in moderation as occasional treats. Learning to appreciate natural tastes of nutritious food is key for long-term health.
   Examples : Delicious but often unhealthy : French fries, sugary soda, candy, deep-fried samosas.
   Nutritious but sometimes less enjoyed : Bitter gourd (karela), plain boiled spinach, unsweetened oats porridge.

5. Madu does not eat vegetables but enjoys biscuits, noodles and white bread. He often has stomach ache and constipation. What changes should he make in his diet to get rid of these problems? Explain your answer.

   Ans :

   Changes Madu should make:
   1. Eat vegetables and fruits daily.
   2. Replace white bread with whole wheat bread (atta bread).
   3. Choose whole grain noodles or pasta instead of those made from maida.
   4. Include pulses (dals, beans, chickpeas) in his meals.
   5. Reduce intake of biscuits and other processed snacks made from refined flour.
   6. Drink plenty of water.

   Madu's current diet is low in dietary fiber, found abundantly in vegetables, fruits, whole grains, and pulses. Biscuits, noodles (often

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from maida), and white bread lack sufficient fiber. Fiber is essential for proper bowel movements; its absence leads to constipation and can cause stomach aches. Increasing fiber intake and ensuring adequate hydration will improve digestion and alleviate his problems.

6. Reshma had trouble seeing things in dim light. The doctor tested her eyesight and prescribed a particular vitamin supplement. He also advised her to include a few food items in her diet.
(i) Which deficiency disease is she suffering from?
(ii) Which food component may be lacking in her diet?
(iii) Suggest some food items that she should include in her diet to overcome this problem (any four).

Ans :

(i) She is likely suffering from Night Blindness.
(ii) Vitamin A may be lacking in her diet.
(iii) Four food items rich in Vitamin A she should include are:
1. Carrots
2. Papaya
3. Spinach (or other leafy green vegetables)
4. Mango

7. You are provided the following:
(i) Canned fruit juice
(ii) Fresh fruit juice
(iii) Fresh fruit
Which one would you prefer and why?

Ans :

Preference : (iii) Fresh fruit.
Why : Fresh fruit provides maximum dietary fiber, vitamins, and minerals in their natural form. Fiber aids digestion and helps manage blood sugar. Fresh fruit juice (ii) loses most fiber during juicing. Canned fruit juice (i) often has added sugars, preservatives, reduced vitamin content, and lacks fiber, making it the least healthy option. Eating the whole fresh fruit is the most beneficial.

8. Gourav got a fracture in his leg. His doctor aligned the bones and put on a plaster. The doctor also gave him calcium tablets. On the second visit, the doctor gave him Vitamin D syrup along with calcium tablets. Refer to Figure 3.5 and answer the following questions:
(i) Why did the doctor give calcium tablets to Gourav?
(ii) On the second visit, why did the doctor give Vitamin D syrup along with calcium tablets
(iii) What question arises in your mind about the choices made by the doctor in giving the medicines?

Ans :

(i) Calcium is the main mineral that builds and strengthens bones. The doctor gave calcium tablets to provide the necessary building material to help repair the fractured bone and promote healing.
(ii) Vitamin D is essential for the body to absorb calcium effectively from the diet and supplements and deposit it into the bones. Giving Vitamin D ensures that the calcium Gourav takes is properly utilized for bone healing.
(iii) Possible questions:
1. Why wasn't Vitamin D given during the first visit along with calcium?
2. Should Gourav also focus on dietary sources of calcium and Vitamin D in addition to supplements?
3. How long will Gourav need to take these supplements?

9. Sugar is an example of carbohydrates. Sugar is tested with iodine solution but it does not change to blue-black colour. What can be a possible reason?

Ans :

The iodine test specifically detects the presence of starch, which is a complex carbohydrate. Common table sugar (sucrose) is a simple carbohydrate. Simple sugars like glucose, fructose, and sucrose do not react with iodine solution to give the characteristic blue-black color. Therefore, even though sugar is a carbohydrate, it doesn't give a positive iodine test because it is not starch.

10. What do you think of Raman's statement, All starches are carbohydrates but not all carbohydrates are starches. Describe the design of an activity to test your answer.

Ans :

Opinion on statement : Raman's statement is correct. Starch is a type of carbohydrate, so all starches belong to the carbohydrate group. However, carbohydrates also include simple sugars (like table sugar) and other complex forms (like cellulose), which are not starch.

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Activity Design :

1. Aim : To demonstrate that starch reacts with iodine, while sugar (another carbohydrate) does not.
2. Materials : Two test tubes, iodine solution, water, starch sample (e.g., cornflour), sugar sample (table sugar).
3. Procedure : Label test tubes 'Starch' and 'Sugar'. Put a small amount of the respective sample in each and add water. Add a few drops of iodine solution to both.
4. Observation : The 'Starch' tube turns blue-black. The 'Sugar' tube shows no color change (remains brownish-yellow).
5. Conclusion : This confirms that starch is a carbohydrate that reacts with iodine, while sugar is a carbohydrate that does not, supporting Raman's statement.

11. While using iodine in the laboratory, a few drops of iodine fell on Mishti's socks and a few fell on her teacher's saree. The drops of iodine on the saree turned blue-black while the colour on the socks did not change. What can be a possible reason?

Ans :

The likely reason is that the teacher's saree contained starch (possibly from being starched after washing to make it stiff), which reacts with iodine to turn blue-black. Mishti's socks were probably made from materials like cotton (cellulose), wool, or synthetic fibers (nylon, polyester) that do not contain starch, hence no color change occurred with iodine.

12. Why are millets considered a healthy choice of food? Can eating just millets suffice for the nutritional requirements of the body? Discuss.

Ans :

Why millets are healthy : Millets are considered healthy because they are rich in dietary fiber, minerals (like iron, magnesium), protein (compared to refined grains), and antioxidants. Many are gluten-free and have a lower glycemic index.

Sufficiency of eating only millets : No, eating only millets is not sufficient for all nutritional needs.

Discussion : A balanced diet requires nutrients from diverse food groups. Relying solely on millets can lead to deficiencies in some essential amino acids, vitamins (like C, B12), and fatty acids. A healthy diet should combine millets with pulses, various vegetables, fruits, nuts/seeds, and possibly dairy or other protein sources to cover all nutritional requirements.

13. You are given a sample of a solution. How would you check the possibility of it being an iodine solution?

Ans :

To check if a solution might be iodine solution, test it with a known source of starch:

1. Take a small amount of a starch source (like rice water, boiled potato paste, cornflour in water, or a piece of bread).
2. Add a few drops of the unknown solution to the starch.
3. Observe the color change. If the starch turns blue-black or dark purple, the sample solution likely co contains iodine. If no such color change occurs, it is probably not iodine solution.

MULTIPLE CHOICE QUESTION

1. What does the Sanskrit saying annena jatani jivanti mean?
(A) Water is essential for all creatures.
(B) Food gives life to living beings.
(C) Exercise leads to a healthy life.
(D) All beings require adequate sleep.

Ans :

(B) Food gives life to living beings.
A Taittiriya Upanishada saying, whose meaning is food gives life to living beings, is presented, emphasizing food's fundamental role for all sustenance and vital energy.

2. What is one of the primary reasons mentioned for the diversity in traditional food consumed in various states of India?
(A) The availability of different spices.
(B) The influence of international cuisines.
(C) The types of crops locally grown in that state.
(D) The popularity of cooking shows.

Ans :

(C) The types of crops locally grown in that state.
The traditional food of any state is usually based on the crops that are cultivated in that particular region, influenced by soil types and climatic conditions.

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3. Why might food choices and preparation practices differ from one another across different regions?
(A) Due to a lack of cooking skills in certain areas.
(B) Because all regions have access to the same ingredients.
(C) Influenced by local crop cultivation, taste preferences, culture, and traditions.
(D) Solely because of government regulations on food.

Ans :

(C) Influenced by local crop cultivation, taste preferences, culture, and traditions.
Food habits are shaped by a combination of factors including what can be grown locally, cultural heritage, established traditions, and the collective taste preferences of a community.

4. What are carbohydrates primarily known for in our diet?
(A) Building body tissues and muscles.
(B) Protecting the body from diseases.
(C) Being a primary source of energy.
(D) Aiding in the digestion of food.

Ans :

(C) Being a primary source of energy.
Carbohydrates, such as those found in cereals, potatoes, and fruits, are a major food component that provides the body with the energy required for various activities and bodily functions.

5. Which of the following food items is mentioned as a source of carbohydrates?
(A) Ghee
(B) Paneer
(C) Potato
(D) Almonds

Ans :

(C) Potato
Potatoes, various cereals including wheat and rice, plus fruits such as bananas, are typical food sources high in carbohydrates, which in turn give the body its energy.

6. Why are carbohydrates and fats referred to as 'energy-giving foods'?
(A) Because they help in repairing body tissues.
(B) Because they protect the body against infections.
(C) Because they provide the body with the necessary energy for activities.
(D) Because they are essential for water absorption.

Ans :

(C) Because they provide the body with the necessary energy for activities.
Both carbohydrates and fats are major sources of energy for the body. Carbohydrates provide immediate energy, while fats serve as a stored energy source, supporting various bodily functions and physical activities.

7. What are proteins primarily known for in terms of their function in the body?
(A) Providing instant energy for short bursts of activity.
(B) Protecting the body by forming a barrier against germs.
(C) Helping in the growth and repair of body tissues.
(D) Regulating body temperature effectively.

Ans :

(C) Helping in the growth and repair of body tissues.
Proteins are essential nutrients often referred to as body-building foods because they play a crucial role in the growth, maintenance, and repair of the body's tissues and muscles.

8. Which of these is mentioned as an animal source of protein?
(A) Soya bean
(B) Moong dal
(C) Eggs
(D) Peas

Ans :

(C) Eggs
Examples of animal-based protein sources include milk, paneer, eggs, fish, and meat, while plant-based sources include soya bean, moong dal, and peas.

9. How do the primary functions of carbohydrates and proteins differ in the body?
(A) Carbohydrates build tissues; proteins provide energy.
(B) Carbohydrates provide energy; proteins help in growth and repair.
(C) Both primarily protect against diseases.
(D) Carbohydrates regulate water balance; proteins store energy.

Ans :

(B) Carbohydrates provide energy; proteins help in growth and repair.

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Carbohydrates are mainly energy-giving foods, providing fuel for the body's activities. Proteins, on the other hand, are body-building foods, essential for the growth and repair of tissues.

10. A growing child needs an adequate amount of a specific nutrient for proper growth and development of muscles and tissues. Which nutrient is most critical for this purpose?
(A) Fats
(B) Carbohydrates
(C) Proteins
(D) Vitamin C

Ans :

(C) Proteins
Proteins are known as body-building foods and are essential for the growth and repair of tissues. Therefore, they are particularly crucial in the diet of growing children for their proper physical development.

11. What is scurvy?
(A) A disease caused by a deficiency of Vitamin D.
(B) A condition characterized by poor vision in darkness.
(C) A disease with symptoms like bleeding and swollen gums, caused by Vitamin C deficiency.
(D) A disorder related to the thyroid gland due to lack of iodine.

Ans :

(C) A disease with symptoms like bleeding and swollen gums, caused by Vitamin C deficiency.
Scurvy is a deficiency disease primarily caused by a lack of Vitamin C. Its characteristic symptoms include bleeding gums, swollen gums, and slow healing of wounds.

12. Which types of fruits were observed by James Lind to help sailors recover from scurvy?
(A) Apples and bananas
(B) Mangoes and papayas
(C) Lemons and oranges
(D) Grapes and berries

Ans :

(C) Lemons and oranges
James Lind observed that sailors who ate citrus fruits such as lemons and oranges recovered from scurvy, as these fruits are rich in Vitamin C.

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13. Why was iodized salt introduced to the population in the Himalayan region and Northern plains of India?
(A) To improve the taste of common salt.
(B) To combat goitre caused by iodine deficiency in their local food and water.
(C) To provide an additional source of energy.
(D) To help in the digestion of food more effectively.

Ans :

(B) To combat goitre caused by iodine deficiency in their local food and water.
The prevalence of goitre (swelling at the front of the neck) was linked to iodine deficiency in the soil of these regions, leading to insufficient iodine in the diet. Iodized salt was introduced to supplement iodine intake.

14. What are nutrients?
(A) Substances in food that primarily add flavor and color.
(B) Components in food that provide energy, support growth, repair, and protect the body.
(C) Only the vitamins and minerals present in fruits and vegetables.
(D) The indigestible parts of food that aid in bowel movement.

Ans :

(B) Components in food that provide energy, support growth, repair, and protect the body.
Nutrients are essential substances found in food that the body needs for energy, growth, maintenance, repair of tissues, and protection against diseases. They include carbohydrates, proteins, fats, vitamins, and minerals.

15. Which of the following is NOT considered a major nutrient for the human body?
(A) Carbohydrates
(B) Proteins
(C) Water
(D) Vitamins

Ans :

(C) Water
Although water is vital for the body, the main nutrients listed are carbohydrates, proteins, fats, vitamins, and minerals. Water and dietary fiber are also recognized as essential components of a balanced diet.

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16. Which vitamin is naturally produced by our body upon exposure to sunlight?
(A) Vitamin A
(B) Vitamin B1
(C) Vitamin C
(D) Vitamin D

Ans :

(D) Vitamin D
Vitamin D is naturally produced in the body when the skin is exposed to sunlight, and it plays a key role in helping the body absorb calcium for strong and healthy bones.

17. Why is it advisable to include uncooked vegetables and fruits in our diet?
(A) Because cooking always enhances all nutrient content.
(B) Because some nutrients, like Vitamin C, can be lost during cooking due to heat.
(C) Because uncooked foods are always easier to digest for everyone.
(D) Because cooking removes all dietary fibres from food.

Ans :

(B) Because some nutrients, like Vitamin C, can be lost during cooking due to heat.
Cooking processes, especially those involving high heat, can lead to the loss of certain heat-sensitive vitamins, such as Vitamin C. Including some raw fruits and vegetables helps retain these nutrients.

18. What is another term for dietary fibres?
(A) Energy boosters
(B) Body builders
(C) Protective nutrients
(D) Roughage

Ans :

(D) Roughage
Dietary fibres are also commonly known as roughage. While they do not provide nutrients, they are crucial for healthy digestion and bowel movements.

19. Which of the following food groups is a good source of roughage?
(A) Butter and ghee
(B) Sugar and jaggery
(C) Green leafy vegetables, fresh fruits, and whole grains
(D) Milk and paneer

Ans :

(C) Green leafy vegetables, fresh fruits, and wholegrains
Plant-based foods such as green leafy vegetables, fresh fruits, whole grains, pulses, and nuts are recognized as good sources of roughage or dietary fibre.

20. An individual is experiencing frequent constipation. A doctor advises them to increase their intake of a particular food component that helps in smooth passage of stools. This advice emphasizes the importance of increasing:
(A) Fats
(B) Proteins
(C) Dietary fibres
(D) Simple carbohydrates

Ans :

(C) Dietary fibres
Dietary fibres (roughage) add bulk to the stool and aid in regular bowel movements, preventing constipation. Whole fruits and salads are rich sources of dietary fibres.

21. How does water primarily help the body in relation to nutrients?
(A) Water itself is a major source of energy.
(B) Water helps the body absorb nutrients from food.
(C) Water converts carbohydrates directly into proteins.
(D) Water significantly increases the fat content of food.

Ans :

(B) Water helps the body absorb nutrients from food.
Water plays a vital role in the digestive process by helping to dissolve nutrients from food, making them available for absorption and utilization by the body.

22. Which scientist is credited with initiating nutrition research in India and analyzing Indian foods for their nutritional value?
(A) James Lind
(B) Dr. Poshita
(C) Coluthur Gopalan
(D) Medu

Ans :

(C) Coluthur Gopalan
Coluthur Gopalan is recognized as the scientist who pioneered nutrition research in India, studied the nutritional content of various Indian foods,

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and contributed to the development of programs such as the Mid Day Meal Scheme.

23. What color change indicates the presence of starch when diluted iodine solution is added to a food item?
(A) The food item turns reddish-brown.
(B) The food item turns greenish-yellow.
(C) The food item turns blue-black.
(D) The food item becomes colorless.

Ans :

(C) The food item turns blue-black.
The test for starch involves adding a few drops of diluted iodine solution to the food sample. A blue-black coloration indicates that starch is present in the food item.

24. If you rub a piece of groundnut on paper and it leaves an oily patch that makes the paper translucent, what nutrient is present in the groundnut?
(A) Starch
(B) Protein
(C) Fat
(D) Vitamin C

Ans :

(C) Fat
The test for fats involves rubbing the food item on paper. If an oily patch appears, making the paper translucent (allowing light to pass through faintly), it indicates the presence of fat.

25. What chemicals are typically used to test for the presence of proteins in a food item, as described in Activity 3.7?
(A) Iodine solution and water.
(B) Copper sulphate solution and caustic soda solution.
(C) Vinegar and baking soda.
(D) Lemon juice and sugar solution.

Ans :

(B) Copper sulphate solution and caustic soda solution.
The test for proteins described involves adding copper sulphate solution and caustic soda solution to the food sample. A violet color indicates the presence of proteins.

26. What is a balanced diet?
(A) A diet consisting of only fruits and vegetables.
(B) A diet that includes all essential nutrients, roughage, and water in the right amounts.
(C) A diet rich in fats and carbohydrates for maximum energy.
(D) A diet that changes every day to include different food items.

Ans :

(B) A diet that includes all essential nutrients, roughage, and water in the right amounts.
A balanced diet is one that provides all the necessary nutrients (carbohydrates, proteins, fats, vitamins, minerals), along with adequate dietary fibre and water, in appropriate proportions to maintain good health.

27. Why are junk foods generally considered unhealthy if consumed frequently?
(A) They are always very expensive.
(B) They have high calories from sugar and fat but low amounts of essential nutrients.
(C) They take a very long time to cook.
(D) They are only made from plant sources.

Ans :

(B) They have high calories from sugar and fat but low amounts of essential nutrients.
Junk foods often provide a lot of calories, primarily from unhealthy fats and sugars, but lack significant amounts of proteins, vitamins, minerals, and dietary fibres, making them nutritionally poor.

28. Which organization in India is responsible for regulating food quality?
(A) Indian Council of Medical Research (ICMR)
(B) Ministry of Health and Family Welfare
(C) Food Safety and Standards Authority of India (FSSAI)
(D) Bureau of Indian Standards (BIS)

Ans :

(C) Food Safety and Standards Authority of India (FSSAI)
The Food Safety and Standards Authority of India (FSSAI) is the government body responsible for regulating and ensuring food quality and safety across the country.

29. What are millets, such as jowar, bajra, and ragi, also called due to their high nutritional value?
(A) Energy grains
(B) Water cereals
(C) Nutri-cereals
(D) Fibre-grains

Ans :

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(C) Nutri-cereals
Millets are referred to as nutri-cereals because they are highly nutritious, being good sources of vitamins, minerals (like iron and calcium), and dietary fibres.

30. What does the term 'food miles' refer to?
(A) The average distance a person walks after eating food.
(B) The total distance a food item travels from the producer to the consumer.
(C) The number of miles a farmer travels to sell produce.
(D) The caloric energy obtained by traveling a mile.

Ans :

(B) The total distance a food item travels from the producer to the consumer.
Food miles represent the entire distance a food product covers from its point of origin (farm or production site) to the end consumer's plate. Reducing food miles is environmentally beneficial.

31. **Assertion (A) :** Consuming a diet rich in fruits, vegetables, and whole grains is generally considered healthy.
Reason (R) : These foods are good sources of vitamins, minerals, and dietary fibres.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Fruits, vegetables, and whole grains are indeed considered healthy because they provide essential vitamins, minerals, and dietary fibres, which contribute to overall well-being and proper bodily functions.

32. Consider the following statements about food nutrients:
1. Fats are primarily body-building foods.
2. Vitamins and minerals are needed in large quantities daily.
3. Carbohydrates are a primary source of energy.
Which of the above statements is/are correct?
(A) 1 only
(B) 3 only
(C) 1 and 2 only
(D) 2 and 3 only

Ans :

(B) 3 only
Proteins are body-building foods. Vitamins and minerals are needed in small quantities. Carbohydrates are a primary energy source. Thus, only statement 3 is correct.

33. A person often feels tired, has bleeding gums, and their wounds heal very slowly. Their diet mainly consists of processed foods and lacks fresh fruits. This person is likely suffering from a deficiency of:
(A) Vitamin D
(B) Vitamin C
(C) Iron
(D) Calcium

Ans :

(B) Vitamin C
Bleeding gums and slow wound healing are classic symptoms of scurvy, which is caused by a deficiency of Vitamin C. Fresh fruits, especially citrus fruits, are rich sources of Vitamin C.

34. Which traditional Indian cooking tool, made of stone, was earlier used for manual grinding?
(A) Chulha
(B) Sil-batta
(C) Electrical grinder
(D) Modern gas stove

Ans :

(B) Sil-batta
The sil-batta, a traditional stone grinder, was commonly used to manually grind spices and other food ingredients before electric grinders became widely available.

35. What is the main purpose of the PM POSHAN initiative (formerly Mid Day Meal Programme) in schools?
(A) To teach students cooking skills.
(B) To provide balanced food to improve the health and nutrition of children.
(C) To reduce the burden of parents packing lunch.
(D) To promote local cuisines among students.

Ans :

(B) To provide balanced food to improve the health and nutrition of children.
The Mid Day Meal Programme, now PM POSHAN, was implemented to address

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nutritional deficiencies by providing balanced meals to children in government and government-aided schools, thereby improving their health and nutritional status.

36. What is the term for the process of adding more nutrients to food during processing to improve its nutritional quality?
(A) Pasteurization
(B) Fermentation
(C) Fortification
(D) Preservation

Ans :

(C) Fortification
Fortification is the process of deliberately increasing the content of one or more essential micronutrients (vitamins or minerals) in a food to improve its nutritional quality and prevent deficiencies.

37. How does the nutritional profile of roasted chana generally compare to potato wafers, based on the information in Activity 3.9?
(A) Potato wafers have more protein and dietary fibre.
(B) Roasted chana has more protein and dietary fibre.
(C) Both have almost identical amounts of fats and carbohydrates.
(D) Potato wafers are lower in total energy (kcal).

Ans :

(B) Roasted chana has more protein and dietary fibre.
Nutritional information showing that roasted chana typically has significantly more protein and dietary fibre, and less fat, compared to potato wafers, making it a healthier snack option.

38. Which of the following is NOT a primary function of water in our diet?
(A) Helping the body absorb nutrients from food.
(B) Removing waste from the body through sweat and urine.
(C) Providing significant amounts of energy.
(D) Maintaining overall health when consumed sufficiently.

Ans :

(C) Providing significant amounts of energy.
Water is essential for absorbing nutrients, eliminating waste, and overall health, but it does not provide caloric energy like carbohydrates, fats, or proteins do.

39. A person is advised to spend some time in sunlight daily to help their body absorb calcium for better bone health. This advice is related to the body's production of which vitamin?
(A) Vitamin A
(B) Vitamin B12
(C) Vitamin C
(D) Vitamin D

Ans :

(D) Vitamin D
Exposure to sunlight enables the body to produce Vitamin D. Vitamin D, in turn, plays a crucial role in the absorption of calcium, which is essential for strong bones and teeth.

40. **Assertion (A) :** Goitre is caused by a deficiency of iodine.
Reason (R) : Iodine is essential for the proper functioning of the thyroid gland.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Goitre, characterized by swelling in the neck, is a direct result of iodine deficiency. Iodine is a crucial component needed by the thyroid gland to produce hormones that regulate metabolism.

41. Which of these food components are primarily known for providing energy to the body?
1. Proteins
2. Carbohydrates
3. Fats

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(B) 2 and 3 only
Carbohydrates are the body's main source of quick energy, while fats provide a more concentrated and stored form of energy. Proteins are primarily for growth and repair, although they can be used for energy if needed.

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42. A marathon runner is seen drinking glucose water during a race. Why is glucose water beneficial in this situation?
(A) It helps in building muscle mass quickly.
(B) Glucose provides instant energy to the body.
(C) It primarily helps in repairing worn-out tissues.
(D) It is mainly for hydrating, with no energy benefit.

Ans :

(B) Glucose provides instant energy to the body.
Glucose is a simple carbohydrate that is readily absorbed by the body and converted into energy. This provides a quick fuel source for athletes during endurance activities like a marathon.

43. Which of the following is mentioned as a symptom of Beriberi, a disease caused by Vitamin B1 deficiency?
(A) Bleeding gums and slow healing of wounds.
(B) Poor vision, especially in darkness.
(C) Swelling, tingling, or burning sensation in feet and hands.
(D) Soft and bent bones.

Ans :

(C) Swelling, tingling, or burning sensation in feet and hands.
Beriberi, resulting from Vitamin B1 deficiency, can manifest with symptoms such as swelling, tingling or burning sensation in feet and hands, and trouble in breathing.

44. What is the significance of food miles in the context of environmental health and supporting local economies?
(A) Higher food miles are always better for food freshness.
(B) Reducing food miles can cut down transport pollution and support local farmers.
(C) Food miles only refer to the distance food travels within a single city.
(D) The concept of food miles is irrelevant to environmental concerns.

Ans :

(B) Reducing food miles can cut down transport pollution and support local farmers.
Shorter food miles mean less transportation, which reduces fuel consumption and pollution. It also often means supporting local agricultural producers and potentially getting fresher produce.

45. What are protective nutrients?
(A) Nutrients that provide the most calories for energy.
(B) Nutrients like proteins that help build body tissues.
(C) Vitamins and minerals that protect the body from diseases and keep it healthy.
(D) Dietary fibres that aid in digestion.

Ans :

(C) Vitamins and minerals that protect the body from diseases and keep it healthy.
Vitamins and minerals are often referred to as protective nutrients because they play vital roles in maintaining the immune system, protecting against various diseases, and ensuring overall health.

46. Which of the following is NOT a good source of fat?
(A) Groundnuts
(B) Rice
(C) Coconut oil
(D) Butter

Ans :

(B) Rice
Various sources of fats including nuts, seeds, oils and butter. Rice is primarily a source of carbohydrates, not fats.

47. What is a key difference in the energy provision by carbohydrates versus fats?
(A) Carbohydrates provide stored energy; fats provide instant energy.
(B) Fats provide instant energy; carbohydrates provide stored energy.
(C) Carbohydrates are primary for instant energy; fats are a source of stored energy.
(D) Neither carbohydrates nor fats provide significant energy.

Ans :

(C) Carbohydrates are primary for instant energy; fats are a source of stored energy.
Carbohydrates are the body's preferred source for quick, readily available energy. Fats, being more energy-dense, serve as a reserve or stored form of energy.

48. All of these are symptoms of Vitamin A deficiency EXCEPT:
(A) Poor vision.
(B) Loss of vision in darkness (night blindness).
(C) Swelling at the front of the neck.
(D) Sometimes complete loss of vision.

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Ans :

(C) Swelling at the front of the neck.
Poor vision, night blindness, and potential complete loss of vision are symptoms associated with Vitamin A deficiency. Swelling at the front of the neck is a symptom of goitre, caused by iodine deficiency.

49. To prevent rickets, which is characterized by soft and bent bones, a diet should include adequate amounts of:
(A) Vitamin C and Iron.
(B) Vitamin D and Calcium.
(C) Vitamin B1 and Iodine.
(D) Vitamin A and Protein.

Ans :

(B) Vitamin D and Calcium.
Rickets is caused by a deficiency of Vitamin D, which is necessary for calcium absorption. Calcium is crucial for bone health. Therefore, both Vitamin D and Calcium are vital in preventing rickets.

MATCHING TYPE QUESTION

50. Match the plant seed type in Column A with its associated leaf venation and root system in Column B:

	Column A		Column B
1.	Monocotyledon (Monocot) Seed	A.	Typically has reticulate venation and a taproot system
2.	Dicotyledon (Dicot) Seed	B.	Example: Wheat plant
3.	Plant with Parallel Venation	C.	Typically has parallel venation and a fibrous root system
4.	Plant with Taproot System	D.	Example: Chickpea plant

(a) 1–A, 2–C, 3–D, 4–B
(b) 1–C, 2–D, 3–B, 4–A
(c) 1–B, 2–A, 3–C, 4–D
(d) 1–D, 2–B, 3–A, 4–C

Ans :

(b) 1–C, 2–D, 3–B, 4–A

Monocot seeds, such as those of the wheat plant, typically have parallel venation and a fibrous root system. Dicot seeds, like chickpea, usually show reticulate venation and a taproot system. Therefore, a plant with parallel venation (like wheat) is a monocot, while a plant with a taproot system (like chickpea) is a dicot.

51. Match the plant seed type or characteristic in Column A with its usually associated features in Column B:

	Column A		Column B
1.	Monocotyledon (Monocot) Plant	A.	Reticulate leaf venation and taproot system
2.	Dicotyledon (Dicot) Plant	B.	Parallel leaf venation and fibrous root system
3.	Example: Maize Seed	C.	Possesses two cotyledons
4.	Example: Chickpea Seed	D.	Possesses a single cotyledon

(a) 1-D, 2-C, 3-A, 4-B
(b) 1-B, 2-A, 3-D, 4-C
(c) 1-B, 2-C, 3-D, 4-A
(d) 1-A, 2-B, 3-C, 4-D

Ans :

(b) 1-B, 2-A, 3-D, 4-C
Monocot plants usually have parallel venation and fibrous roots. Dicot plants usually have reticulate venation and taproots. Maize is a monocot. Chickpea is a dicot.

52. Match the food component in Column A with its primary function in the body in Column B:

	Column A		Column B
1.	Carbohydrates	A.	Help in growth and repair of the body
2.	Proteins	B.	Provide stored energy and keep the body warm
3.	Fats	C.	Protect the body from various diseases
4.	Vitamins	D.	Provide instant energy for activities

(a) 1-D, 2-A, 3-B, 4-C (b) 1-A, 2-D, 3-C, 4-B
(c) 1-D, 2-C, 3-A, 4-B (d) 1-B, 2-A, 3-D, 4-C

Ans :

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(a) 1-D, 2-A, 3-B, 4-C
Carbohydrates are a primary source of energy. Proteins are body-building foods for growth and repair. Fats provide stored energy. Vitamins are protective nutrients that help fight diseases.

53. Match the Vitamin/Mineral in Column A with the deficiency disease it prevents or a key food source in Column B:

	Column A		Column B
1.	Vitamin A	A.	Prevents Scurvy (e.g., Amla, citrus fruits)
2.	Vitamin C	B.	Prevents Goitre (e.g., Iodized salt)
3.	Iron	C.	Prevents Night Blindness (e.g., Carrots, papaya)
4.	Iodine	D.	Prevents Anaemia (e.g., Spinach, beetroot)

(a) 1-B, 2-D, 3-A, 4-C
(b) 1-C, 2-A, 3-D, 4-B
(c) 1-C, 2-D, 3-B, 4-A
(d) 1-D, 2-A, 3-C, 4-B

Ans :

(b) 1-C, 2-A, 3-D, 4-B
Vitamin A is crucial for good vision. Vitamin C prevents scurvy. Iron is essential for blood and prevents anaemia. Iodine is necessary for thyroid function and prevents goitre.

54. Match the food test in Column A with the nutrient it detects or the observation seen in Column B:

	Column A		Column B
1.	Test for Starch	A.	Food item leaves an oily patch on paper
2.	Test for Fats	B.	Solution turns violet with copper sulphate & caustic soda
3.	Test for Proteins	C.	Example: Millets like Jowar, Bajra, Ragi
4.	Nutri-cereals	D.	Iodine solution turns food blue-black

(a) 1-D, 2-A, 3-B, 4-C
(b) 1-A, 2-D, 3-C, 4-B
(c) 1-D, 2-C, 3-A, 4-B
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(a) 1-D, 2-A, 3-B, 4-C
Iodine tests for starch (blue-black colour). Oily patch on paper indicates fats. Violet colour with specific reagents indicates proteins. Millets are known as nutri-cereals for their nutritional value.

55. Match the dietary concept in Column A with its correct description in Column B:

	Column A		Column B
1.	Balanced Diet	A.	Distance food travels from farm to consumer
2.	Roughage	B.	High in sugar/fat, low in essential nutrients
3.	Junk Food	C.	Contains all essential nutrients, fibre, and water in right amounts
4.	Food Miles	D.	Dietary fibre that aids digestion but provides no nutrients

(a) 1-A, 2-C, 3-D, 4-B
(b) 1-C, 2-B, 3-A, 4-D
(c) 1-D, 2-A, 3-B, 4-C
(d) 1-C, 2-D, 3-B, 4-A

Ans :

(d) 1-C, 2-D, 3-B, 4-A
A balanced diet has all necessary components in correct proportions. Roughage is dietary fibre aiding digestion. Junk food is unhealthy. Food miles measure food transport distance.

56. Match the traditional food item or practice from Column A with the region or modern counterpart from Column B:

	Column A		Column B
1.	Makki di Roti, Sarson da Saag	A.	Traditional stone grinder
2.	Idli, Dosa	B.	Traditional food of Punjab
3.	Sil-batta	C.	Modern cooking appliance replacing Chulha
4.	Gas Stove	D.	Traditional food of South India (e.g., Karnataka)

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(a) 1-D, 2-B, 3-A, 4-C
(b) 1-B, 2-C, 3-D, 4-A
(c) 1-A, 2-D, 3-C, 4-B
(d) 1-B, 2-D, 3-A, 4-C

Ans :

(d) 1-B, 2-D, 3-A, 4-C
Makki di Roti and Sarson da Saag are from Punjab. Idli and Dosa are South Indian. Sil-batta is a traditional grinder. A gas stove is a modern cooking stove.

VERY SHORT QUESTION

57. What is the meaning of the Sanskrit saying 'annena jatani jivanti'?

Ans :

Food gives life to living beings.

58. On what factor is the traditional food of any state usually based?

Ans :

The traditional food of any state is usually based on the crops grown in that state.

59. Name one traditional cooking tool and one modern cooking tool.

Ans :

Traditional : chulha ; Modern : gas stove.

60. What is the primary function of carbohydrates in our diet?

Ans :

Carbohydrates are one of the primary sources of energy in our diet.

61. Give one example of a food item rich in fats.

Ans :

Ghee (or nuts, oils, etc.).

62. Why are carbohydrates and fats called energy-giving foods?

Ans :

They provide us energy for performing various activities.

63. What is the main role of proteins in the body?

Ans :

Proteins help in the growth and repair of our body.

64. Name one plant source of protein.

Ans :

Pulses (or beans, peas, nuts).

65. What disease is caused by the deficiency of Vitamin C?

Ans :

Scurvy is caused by the deficiency of Vitamin C.

66. What is the main symptom of goitre?

Ans :

Swelling at the front of the neck is a symptom of goitre.

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67. Which mineral deficiency causes goitre?

Ans :

Goitre is caused by a deficiency of iodine.

68. Name one food source of Vitamin A.

Ans :

Papaya (or carrot, mango, milk).

69. What is the function of Vitamin D in our body?

Ans :

Vitamin D helps the body absorb calcium for bone and teeth health.

70. What are nutrients?

Ans :

Nutrients are food components that provide energy, support growth, help repair and protect our body from diseases and maintain various bodily functions.

71. What is another name for dietary fibres?

Ans :

Dietary fibres are also known as roughage.

72. What colour change indicates the presence of starch in a food item when tested with iodine solution?

Ans :

A blue-black colour indicates the presence of starch.

73. What is a balanced diet?

Ans :

A diet that has all essential nutrients, roughage, and water in the right amount for proper growth and development of the body.

74. What are millets also called due to their high nutritional value?

Ans :

Millets are also called nutri-cereals.

75. What does FSSAI stand for?

Ans :

Food Safety and Standard Authority of India.

76. What are food miles?

Ans :

The entire distance travelled by a food item, from the producer to the consumer, is known as its food miles.

SHORT ANSWER QUESTION

77. Why is there diversity in the food consumed in different regions of India?

Ans :

Food diversity in India is due to varied soil types and climatic conditions influencing crop cultivation, alongside regional taste preferences, culture, and traditions.

78. How have cooking practices changed over time? Give two examples.

Ans :

Cooking practices have shifted from traditional to modern methods. For example, chulhas have been replaced by gas stoves, and manual grinding with sil-battas has given way to electrical grinders.

79. Why does a marathon runner drink glucose water during a race?

Ans :

A marathon runner drinks glucose water because glucose, a carbohydrate, provides instant energy, which is crucial for sustaining performance during a long race.

80. What are fats? Name two plant sources and two animal sources of fats.

Ans :

Fats are energy-giving food components that serve as stored energy. Plant sources include nuts (e.g., almonds) and seeds (e.g., sunflower seeds); animal sources include ghee and butter.

81. Why are proteins called body-building foods? Who needs proteins in larger quantities?

Ans :

Proteins are called body-building foods because they help in the growth and repair of our body. Sportspersons need proteins in larger quantities to build their muscles.

82. What are vitamins and minerals also called? Why are they essential for our body?

Ans :

Vitamins and minerals are also called protective nutrients. They are essential because they protect our body from diseases and keep us healthy, required in small amounts.

83. What did James Lind observe about sailors during his voyage in 1746? What conclusion was drawn?

Ans :

James Lind observed that sailors who consumed lemons and oranges recovered from bleeding and swollen gums. The conclusion was that citrus fruits cure scurvy, caused by Vitamin C deficiency.

84. What problem was observed in the Himalayan region regarding health in the 1960s? How was it addressed?

Ans :

Symptoms of swelling at the front of the neck (goitre) were prevalent due to iodine deficiency. This was addressed by supplementing common salt with iodine to make iodised salt.

85. List two functions and two sources of Vitamin B.

Ans :

Vitamin B keeps the heart healthy and supports the body in performing various functions. Sources include legumes, nuts, whole grains, seeds and milk products.

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86. What are the symptoms of anaemia? Which mineral deficiency causes it and what are its food sources?

Ans :

Symptoms of anaemia include weakness and shortness of breath. It is caused by iron deficiency. Food sources include green leafy vegetables, beetroot, and pomegranate.

87. Why is it important to include fruits and uncooked vegetables in our diet?

Ans :

Including fruits and uncooked vegetables is important because some nutrients, like Vitamin C, can be lost during cooking due to high heat.

88. What is roughage and why is it an essential component of our food despite not providing nutrients?

Ans :

Roughage, or dietary fibre, is mainly plant products that do not provide nutrients but are essential for helping our body get rid of undigested food and ensuring smooth passage of stools.

89. How does water help our body? Why should we drink sufficient water?

Ans :

Water helps the body absorb nutrients from food and removes waste through sweat and urine. We should drink sufficient water to keep ourselves healthy.

90. What are the three main nutrients that can be detected by simple tests?

Ans :

Starch (a type of carbohydrate), fat, and protein can be detected using fairly simple tests in a school laboratory setting.

91. How can you test for the presence of fats in a food item?

Ans :

Place a small amount of the food item on paper, wrap and press it. An oily patch on the paper, which makes it translucent, indicates the presence of fat.

92. Describe the test for proteins in a food item. What indicates a positive result?

Ans :

Make a paste of the food, add water, then two drops of copper sulphate solution and ten drops of caustic soda solution. A violet colour indicates the presence of proteins.

93. Why might nutritional requirements vary from person to person?

Ans :

Nutritional requirements vary based on age, gender, physical activity levels, health status, and lifestyle. Different individuals need different types and amounts of nutrients.

94. What are junk foods? Why is frequent consumption of junk food not good for health?

Ans :

Junk foods are high in calories, sugar, and fat, but low in proteins, minerals, vitamins, and dietary fibres. Frequent consumption can lead to obesity and other health problems.

95. What are millets and why are they considered highly nutritious?

Ans :

Millets are small-sized grains like jowar and bajra. They are highly nutritious as they are good sources of vitamins, minerals (like iron and calcium), and dietary fibres.

96. Why is reducing food miles important? Give two reasons.

Ans :

Reducing food miles is important as it helps cut down transport costs and pollution, supports local farmers, and keeps food fresh and healthy.

LONG ANSWER QUESTION

97. Explain the relationship between locally grown crops and the traditional food items of a region. Why does this diversity exist across India?

Ans :

The traditional food of a region is usually based on the crops that are locally grown there, which in turn depend on the soil type and climatic conditions. India, being an agricultural country

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with diverse geography, supports various crops in different regions, leading to a rich diversity in food habits influenced also by culture and taste.

98. What are the major nutrients found in our food? Briefly describe the main function of carbohydrates, fats, and proteins. Give two food sources for each.

Ans :

Major nutrients are carbohydrates, proteins, fats, vitamins, and minerals. Carbohydrates (e.g., rice, potato) and fats (e.g., oil, nuts) are primary energy sources. Proteins (e.g., pulses, milk) are body-building foods, essential for growth and repair of the body.

99. What are deficiency diseases? Explain with the examples of scurvy and rickets, including their causes, symptoms, and food sources that can help.

Ans :

Deficiency diseases occur due to the lack of one or more essential nutrients in the diet over a long period. Scurvy, caused by Vitamin C deficiency (sources: citrus fruits), leads to bleeding gums and slow wound healing. Rickets, from Vitamin D deficiency (sources: sunlight, milk, eggs), causes soft and bent bones.

100. Describe the role of vitamins A, B, C, and D in maintaining health. For each vitamin, list one key function and one common food source.

Ans :

Vitamin A keeps eyes and skin healthy (source: carrot). Vitamin B keeps the heart healthy and supports body functions (source: whole grains). Vitamin C helps the body fight diseases (source: lemon). Vitamin D helps absorb calcium for bones (source: sunlight, milk).

101. What are dietary fibres and water? Explain why they are considered essential components of a balanced diet even though dietary fibres do not provide nutrients.

Ans :

Dietary fibres (roughage) are plant-based components that aid in digestion and bowel movement. Water is vital for absorbing nutrients and removing waste. Though fibres don't provide nutrients, they ensure smooth digestion and prevent constipation, making them crucial for a balanced diet.

102. Explain the process for testing the presence of starch and protein in given food samples. What observations would indicate a positive result for each test?

Ans :

For starch, add 2-3 drops of dilute iodine solution to the food sample; a blue-black colour indicates starch. For protein, make a paste of the food, add water, 2 drops of copper sulphate, and 10 drops of caustic soda solution; a violet colour indicates protein.

103. What constitutes a balanced diet? Why is it important to consume a balanced diet? What changes might you suggest to a person whose diet is not balanced?

Ans :

A balanced diet contains all essential nutrients, roughage, and water in the right proportions for proper growth and development. It is important for maintaining good health and preventing diseases. One should include a variety of fruits, vegetables, whole grains, pulses, and dairy, and reduce junk food.

104. What are millets? Why are they gaining popularity and referred to as 'nutri-cereals'? Mention any two benefits of including millets in our diet.

Ans :

Millets are small-sized grains like jowar, bajra, and ragi. They are gaining popularity due to their numerous health benefits and are called 'nutri-cereals' because they are rich sources of vitamins, minerals (iron, calcium), and dietary fibres. Benefits include contributing to a balanced diet and being easily cultivable.

105. Explain the concept of 'food miles'. How does eating locally grown food help in reducing food miles and what are the broader benefits of this practice?

Ans :

Food miles refer to the distance food travels from the farm to the consumer. Eating locally grown food reduces this distance, thereby lowering transportation costs and pollution. It also supports local farmers, ensures fresher food, and benefits the environment.

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106. Health is the Ultimate Wealth. Explain this statement in the context of eating habits. How can mindful eating contribute to good health? (Evaluating)

Ans :

This statement means good health is more valuable than any material wealth. Poor eating habits, like consuming excessive junk food, can lead to diseases, diminishing quality of life. Mindful eating, which involves choosing a balanced diet and avoiding unhealthy foods, directly contributes to maintaining good health.

CASE BASED QUESTION

107. Rohan is a 12-year-old boy who loves eating packaged chips and sugary drinks every day after school. He often complains of feeling tired and finds it difficult to concentrate on his studies. His mother notices he rarely eats fruits or vegetables.

(i) What types of food components are likely high in Rohan's current snack choices?
(ii) Which essential nutrients might be lacking in Rohan's diet based on his food preferences?
(iii) What health problems might Rohan face in the long run if he continues with these eating habits?
(iv) Suggest two simple dietary changes Rohan can make to improve his health.

Ans :

(i) Rohan's snacks (packaged chips and sugary drinks) are likely high in fats, sugar (a carbohydrate), and calories.
(ii) Rohan's diet might be lacking in vitamins, minerals, proteins, and dietary fibres as he rarely eats fruits or vegetables.
(iii) Rohan might face health problems like obesity, dental issues, nutritional deficiencies, and reduced energy levels, impacting his growth and concentration.
(iv) Rohan can replace packaged chips with roasted chana or fruits, and sugary drinks with water, milk, or fresh fruit juice.

108. A remote village community primarily consumes polished rice and a limited variety of locally grown vegetables. Many children in the community show symptoms like poor vision, especially in dim light, and often fall sick.

(i) Which vitamin deficiency is likely causing poor vision in dim light among the children?
(ii) What types of food should be included in their diet to address this deficiency?
(iii) Why might consuming only polished rice contribute to nutritional deficiencies?

Ans :

(i) The poor vision in dim light (night blindness) is likely caused by a deficiency of Vitamin A.
(ii) Foods rich in Vitamin A like papaya, carrots, mangoes, milk, and green leafy vegetables should be included in their diet.
(iii) Polishing rice removes the outer layers which contain essential nutrients like Vitamin B1and dietary fibre, leading to potential deficiencies.

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109. During a science class, students performed tests on different food items. When iodine solution was added to a boiled potato slice, it turned blue-black. When a few drops of oil were pressed on paper, it left an oily, translucent patch.

(i) What nutrient is confirmed to be present in the boiled potato slice?
(ii) What nutrient is indicated by the oily, translucent patch left by the oil?
(iii) If a food item like groundnuts showed positive results for both the paper test (oily patch) and the violet colour test with copper sulphate and caustic soda, what nutrients does it contain?

Ans :

(i) Starch (a type of carbohydrate) is confirmed to be present in the boiled potato slice.
(ii) Fat is indicated by the oily, translucent patch.
(iii) Groundnuts would contain both fats and proteins.

110. Mrs. Sharma wants to ensure her family eats healthy. She read that including millets is beneficial. She decides to replace some of their regular wheat chapati meals with ragi (finger millet) dosas and bajra (pearl millet) khichdi.

(i) What are two nutritional benefits Mrs. Sharma's family will get from including ragi and bajra?
(ii) Besides nutritional benefits, how might choosing millets also be environmentally beneficial?
(iii) What does the term 'nutri-cereals' signify about millets?

Ans :

(i) Her family will get good amounts of dietary fibre, minerals like iron and calcium, and various vitamins from ragi and bajra.
(ii) Millets can be easily cultivated in different climatic conditions and often require less water than wheat or rice, making them environmentally beneficial.
(iii) 'Nutri-cereals' signifies that millets are highly nutritious grains, providing many essential components required for the normal functioning of our body.

111. An elderly person, Mr. Gupta, has been advised by his doctor to increase his fibre intake due to persistent constipation. He usually eats white bread sandwiches for breakfast and avoids salads, thinking they are difficult to digest.
(i) What is the role of dietary fibre in preventing constipation?
(ii) Suggest two fibre-rich food items that Mr. Gupta can easily incorporate into his breakfast instead of white bread.
(iii) Besides salads, what are two other good sources of dietary fibre Mr. Gupta could include in his other meals?

Ans :

(i) Dietary fibre (roughage) helps the body get rid of undigested food and ensures smooth passage of stools, thus preventing constipation.
(ii) Mr. Gupta can incorporate whole-grain bread or oats (dalia/porridge) for breakfast to increase his fibre intake.
(iii) Mr. Gupta could include whole fruits, pulses (like lentils and beans), and other vegetables (cooked or raw) in his other meals.

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CHAPTER 4

EXPLORING MAGNETS

SUMMARY

1. MAGNETIC AND NON-MAGNETIC MATERIALS

1.1 Magnets

Introduced through a story about sailors needing direction, leading to the concept of the magnetic compass. Magnets can be natural (lodestones) or artificial, made from materials like iron. Artificial magnets come in various shapes like bar, U-shaped, and ring magnets.

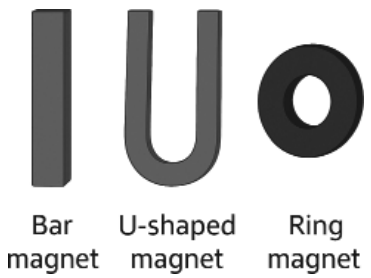

Figure : Magnets of different shapes

1.2 Magnetic Materials

These are materials attracted to a magnet. Iron is a key example; nickel and cobalt are also magnetic metals.

1.3 Non-magnetic Materials

These materials are not attracted to a magnet. Examples include wood, rubber, plastic, and glass.

2. POLES OF MAGNET

2.1 Identifying Poles

When a bar magnet is brought near iron filings, the filings stick most densely near the ends of the magnet.

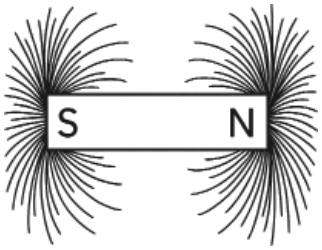

Figure : Iron filings sticking to a bar magnet

2.2 North and South Poles

These ends where magnetic attraction is strongest are called the poles of the magnet : the North pole and the South pole.

2.3 Poles Exist in Pairs

It's impossible to have a magnet with a single pole. Even if a magnet is broken, each piece will have both a North and a South pole.

3. FINDING DIRECTIONS

3.1 Directional Property

A freely suspended magnet always comes to rest pointing in the North-South direction. This happens because Earth itself acts like a giant magnet.

3.2 North and South Seeking Poles

The end pointing North is the North pole (or North-seeking pole), and the end pointing South is the South pole (or South-seeking pole).

3.3 Testing for Magnetism

This property can be used to test if an object is a magnet; a non-magnetic iron bar suspended freely will not consistently align North-South.

3.4 Magnetic Compass

This device uses the directional property of magnets. It contains a magnetized needle that can rotate freely, aligning itself with the Earth's

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North-South magnetic field. The dial beneath the needle is marked with directions. The North-pointing end is often painted red.

Figure : A magnetic compass

4. ATTRACTION AND REPULSION BETWEEN MAGNETS

4.1 Interaction

Like poles (North-North or South-South) repel each other, while unlike poles (North-South) attract each other.

4.2 Identifying Magnets

Repulsion is a sure test for magnetism. An unmagnetized iron bar will be attracted to both poles of a magnet, whereas another magnet will be repelled by one pole and attracted by the other.

4.3 Compass Interaction

A compass needle (being a magnet) deflects when another magnet is brought near it, repelling like poles and attracting unlike poles.

4.4 Magnetic Field Through Materials

The magnetic effect (attraction/repulsion) can pass through non-magnetic materials like wood, cardboard, plastic, and glass without significant change.

5. FUN WITH MAGNETS

This section suggests several fun activities demonstrating magnetic properties, such as making a magnetic garland, navigating a maze with magnets, picking up submerged paper clips, and creating toy cars that repel each other.

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5.1 Care for Magnets

Magnets can lose their properties if heated, dropped, or hammered. They should be stored properly, often in pairs with unlike poles adjacent and separated by wood, with soft iron pieces (keepers) across the ends. They should also be kept away from electronic devices like mobile phones.

NCERT ACTIVITY

Activity 4.1 : Let us explore

1. Collect a few objects made of different materials and also a magnet.
2. Predict which of the objects will stick to the magnet. Write your prediction in Table .
3. Now hold a magnet in your hand and bring it near the objects one by one (Figure). Observe which of the objects stick to the magnet.

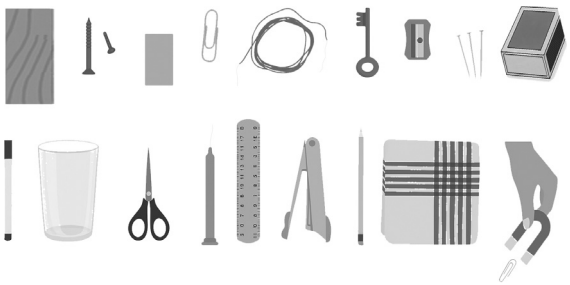

Figure : Identifying the materials attracted by a magnet

4. Record your observations in table .

Table : Identifying the materials attracted by a magnet

Name of the object	Material which the object is made of (plastic/wood/ glass/iron/any other)	Attracted by the magnet (Yes/No)	
		Prediction	Observation
Pencil	Wood		
Eraser	Rubber		

Ans :

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Name of the object	Material which the object is made of (plastic/wood/ glass/iron/any other)	Attracted by the magnet (Yes/No)	
		Prediction	Observation
Pencil	Wood/ Graphite	No	
Eraser	Rubber	No	
Iron Nail	Iron	Yes	
Paper Clip	Steel (contains Iron)	Yes	
Plastic Ruler	Plastic	No	
Glass Tumbler	Glass	No	
Scissors	Steel / Plastic	Yes	
Key (if steel)	Steel (contains Iron)	Yes	
Key (if brass)	Brass	No	
Wooden Block	Wood	No	

Activity 4.2 : Let us Investigate

1. Spread some iron filings (very small pieces of iron) on a sheet of paper.
2. Place a bar magnet over them. Tap the paper and observe carefully what happens to the iron filings.

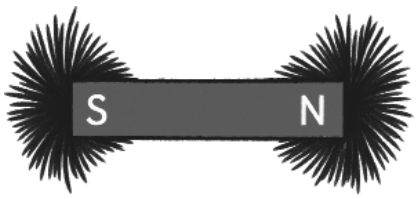

Figure : Iron filings sticking to a bar magnet

Do you observe anything special about the way they stick to the magnet? Do the iron filings stick all over the magnet uniformly? Or do the iron filings stick more at some places?

Ans :

Based on the text following the activity description:

1. Yes, something special is observed.
2. The iron filings do not stick all over the magnet uniformly.
3. The iron filings stick more at some places. Specifically, maximum iron filings stick near the ends of the bar magnet while a very few iron filings stick at the remaining part of the magnet.

Activity 4.3 : Let us experiment

1. Suspend a bar magnet with a thread tied to the middle of the magnet as shown in Figure. You may need to adjust the position of the string till the magnet is balanced horizontally.

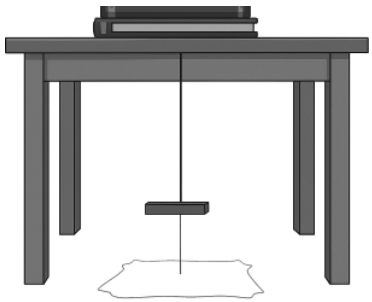

Figure : A freely suspended bar magnet

2. Now rotate the magnet gently in the horizontal direction and let it come to rest.
3. Mark the position corresponding to the ends of the magnet on the ground (or on a piece of paper stuck to the ground). Join these two points on the ground with a line. This line indicates the direction along which the magnet comes to rest.
4. Now again rotate the magnet by giving a gentle push at its one end and wait till it comes to rest. Does the magnet rest along the same line?

Ans :

Yes, the magnet rests along the same line each time it comes to rest after being disturbed.
The accompanying text explains that a freely suspended magnet always comes to rest pointing in the Earth's North-South direction.

1. The end pointing towards the geographic North is called the North-seeking pole (or North pole).
2. The end pointing towards the geographic South is called the South-seeking pole (or South pole).

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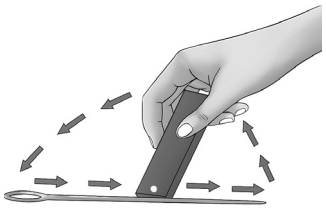
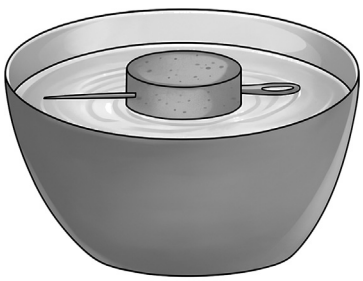
Activity 4.4 : Let us construct

1. Collect a few materials like a cork piece, iron sewing needle, a permanent bar magnet, a glass bowl and water.
2. Place the iron sewing needle on a wooden table. Then keep any one pole of the magnet at one end of the needle. Move the magnet over the needle along its length as shown in Figure (a). When it reaches the other end of the needle, lift it up.



(a) Making an iron needle a magnet

3. Bring the same pole of the magnet you started with to the same end of the sewing needle from which you began, and repeat the previous step. Repeat this process at least 30 to 40 times.
4. Bring some iron filings or steel pins near the needle. If the pins or iron filings get attracted to the needle, then that means that the needle has become a magnet.
5. Pass this needle through the cork horizontally. Float the cork in a glass bowl filled with water, such that the needle always remains above the level of water as shown in Figure (b).



(b) A compass needle in a bowl of water

6. When the needle comes to rest, your magnetic compass is ready for use. Note the direction in which either side of the needle points.
7. Rotate the cork gently and wait till it stops rotating. Repeat this a few more times. Do the ends of the needle always point in the same direction?

Ans :

Yes, the ends of the needle will always point in the same direction when it comes to rest.

Activity 4.5 : Let us experiment

1. Take a pair of bar magnets on which North and South poles have been marked. Mark the two bar magnets as A and B.
2. Place the longer side of magnet A over 5-6 round shaped pencils as shown in Figure (a).
3. Now bring one end of magnet B near the end of magnet A placed on the pencils. Make sure that the two magnets do not touch each other. Observe what happens.
4. Next, bring the other end of magnet B near the same end of magnet A (Figure (b)).

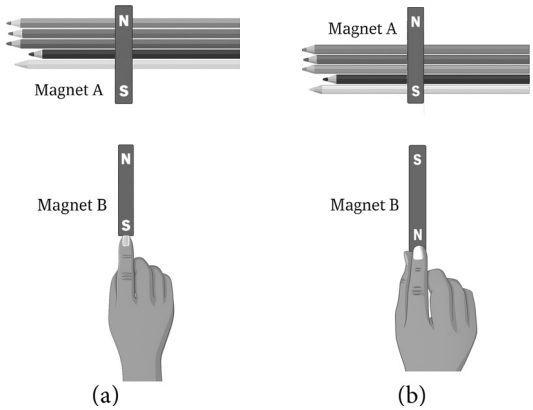


Figure : Interaction between two bar magnets

Does the magnet A on the pencils begin to move? Does it always move in the direction of the approaching magnet? What do these observations suggest?

Ans :

When the ends of the magnets are brought near each other:

1. Magnet A on the pencils will begin to move.
2. It does not always move in the direction of the approaching magnet (magnet B). Sometimes it will move towards magnet B (attraction), and sometimes it will move away from magnet B (repulsion).

These observations suggest the fundamental rule of interaction between magnetic poles:

1. Unlike poles attract : The North pole of one magnet and the South pole of another magnet attract each other.

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2. Like poles repel : The North pole of one magnet repels the North pole of another magnet. Similarly, the South pole of one magnet repels the South pole of another magnet.

Activity 4.6 : Let us experiment

1. Take a magnetic compass and a bar magnet.
2. Place the magnetic compass over a horizontal surface and wait for its needle to come to rest.
3. Now slowly bring North pole of the bar magnet close to the North pole of the compass needle as shown in Figure (a). Observe the compass needle carefully. What do you observe? Does the needle deflect? If yes, in which direction?

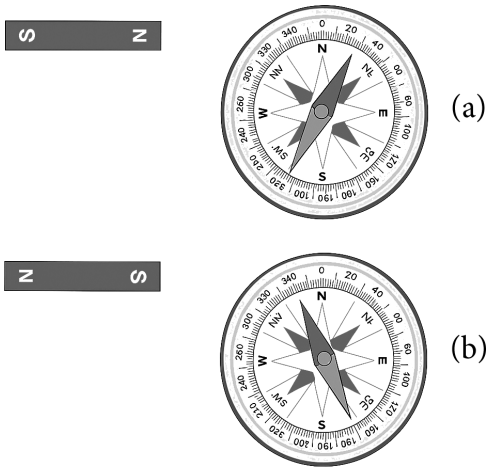

Figure : A compass needle and a magnet

4. Now repeat the above step with the South pole of the bar magnet. Do you observe any difference this time?

Ans :

1. When the North pole of the bar magnet is brought close to the North pole of the compass needle:
   (i) Yes, the compass needle deflects.
   (ii) It deflects away from the bar magnet (as shown in Figure (a)). This happens because the North pole of the compass needle (which is itself a small magnet) is repelled by the North pole of the bar magnet (like poles repel).
2. When the South pole of the bar magnet is brought close to the North pole of the compass needle:
   (i) Yes, a difference is observed. The needle deflects again.
   (ii) This time, it deflects towards the bar magnet (as shown in Figure (b)). This happens because the North pole of the compass needle is attracted to the South pole of the bar magnet (unlike poles attract).

Activity 4.7 : Let us investigate

1. Repeat the first or second part of Activity 4.6.

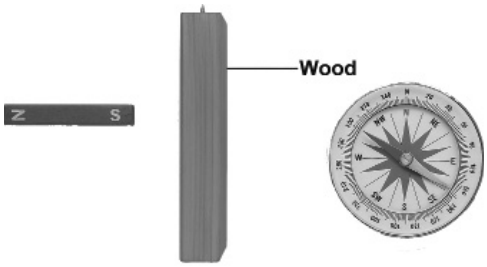

Figure : Compass needle and a magnet with a piece of wood in between

2. Without disturbing the bar magnet and magnetic compass, place a piece of wood between them, perpendicular to the table as shown in Figure. Observe the compass needle carefully.
3. Is there any effect on the deflection of compass needle due to the piece of wood? Record your observation in Table.
4. Repeat the process by replacing the piece of wood with a cardboard sheet, thin plastic sheet and a thin glass sheet.

Ans :

Table : Observing the effect of magnet through non-magnetic materials

S. no.	Material placed between the magnet and the compass needle	Observations
1.	Wood	No appreciable change in deflection
2.	Cardboard	No appreciable change in deflection
3.	Plastic	No appreciable change in deflection
4.	Glass	No appreciable change in deflection

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NCERT EXERCISE

1. Fill in the blanks

(i) Unlike poles of two magnets _____ each other, whereas like poles _____ each other.

Ans :

Unlike poles of two magnets attract each other, whereas like poles repel each other.

(ii) The materials that are attracted towards a magnet are called _____.

Ans :

The materials that are attracted towards a magnet are called magnetic materials (e.g., iron, nickel, cobalt).

(iii) The needle of a magnetic compass rests along the _____ direction.

Ans :

The needle of a magnetic compass rests along the north-south direction.

(iv) A magnet always has _____ poles.

Ans :

A magnet always has two poles (a North pole and a South pole).

2. State whether the following statements are True (T) or False (F).

(i) A magnet can be broken into pieces to obtain a single pole. [ ]

Ans :

F (False). Magnetic poles always exist in pairs. If you break a magnet, each piece will become a new magnet with both a north and a south pole.

(ii) Similar poles of a magnet repel each other. [ ]

Ans :

T (True). Like poles (North-North or South-South) repel each other.

(iii) Iron filings mostly stick in the middle of a bar magnet when it is brought near them. [ ]

Ans :

F (False). Iron filings are attracted most strongly to the poles (the ends) of a bar magnet, where the magnetic force is strongest. They stick very little, or not at all, in the middle.

(iv) A freely suspended bar magnet always aligns with the north-south direction. [ ]

Ans :

T (True). A freely suspended magnet aligns itself with the Earth's magnetic field, pointing approximately towards the geographic North and South poles.

3. Column I shows different positions in which one pole of a magnet is placed near that of the other. Column II indicates the resulting interaction between them for different situations. Fill in the blanks.

Column I	Column II
N – N	.....
N –	Attraction
S – N	.....
..... – S	Repulsion

Ans :

Column I	Column II
N – N	Repulsion
N – S	Attraction
S – N	Attraction
S – S	Repulsion

Like poles (N-N, S-S) repel each other. Unlike poles (N-S, S-N) attract each other.

4. Atharv performed an experiment in which he took a bar magnet and rolled it over a heap of steel U-clips (Figure). According to you, which of the options given in Table is likely to be his observation?

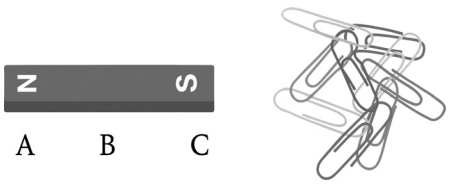

Figure : Bar magnet and heap of steel U-clips

Table shows four options for the number of pins attracted at positions A, B, and C

Option	Position A	Position B	Position C
(i)	10	2	10
(ii)	10	10	2
(iii)	2	10	10
(iv)	10	10	10

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Ans :

(i) The magnetic strength of a bar magnet is strongest at its poles (ends, A and C) and weakest in the middle (B). Therefore, the most U-clips will be attracted to positions A and C, and the fewest will be attracted to position B. Option (i) reflects this pattern.

5. Reshma bought three identical metal bars from the market. Out of these bars, two were magnets and one was just a piece of iron. How will she identify which two amongst the three could be magnets (without using any other material)?

Ans :

Reshma can identify the magnets using the principle that repulsion is the sure test for magnetism. Attraction can occur between two magnets or between a magnet and a piece of iron.

Label the bars : Label them Bar 1, Bar 2 and Bar 3.
Test Bar 1 and Bar 2 : Bring one end of Bar 1 close to both ends of Bar 2, one after the other.

1. Scenario A (Repulsion) : If Bar 1 repels either end of Bar 2, then both Bar 1 and Bar 2 are magnets. Bar 3 must be the iron piece.
2. Scenario B (Attraction only) : If Bar 1 attracts both ends of Bar 2, then one of them is a magnet and the other is the iron piece. (We don't yet know which is which, only that Bar 3 must be a magnet).

Test Further (if Scenario B occurred) : Now take Bar 3 (which we know is a magnet from Scenario B) and bring one of its ends close to both ends of Bar 1.

1. If repulsion occurs, Bar 1 is the other magnet, and Bar 2 is the iron piece.
2. If only attraction occurs, Bar 1 must be the iron piece, and Bar 2 is the other magnet.
3. Summary : Pick any bar. Test it against the other two. If it repels one of the other bars, both are magnets. If it only attracts both other bars, then the first bar is iron, and the other two are magnets.

6. You are given a magnet which does not have the poles marked. How can you find its poles with the help of another magnet which has its poles marked?

Ans :

You can use the known properties of attraction and repulsion between magnetic poles.
Take the marked magnet (whose North and South poles are known).
Bring the North pole of the marked magnet near one end of the unmarked magnet.
If there is repulsion, that end of the unmarked magnet is its North pole. The opposite end is the South pole.
If there is attraction, that end of the unmarked magnet is its South pole. The opposite end is the North pole.

7. A bar magnet has no markings to indicate its poles. How would you find out near which end its North pole is located without using another magnet?

Ans :

You can use the directive property of magnets, which relies on the Earth's magnetic field:
Suspend the bar magnet freely so it can rotate horizontally. You can do this by tying a thread securely around its center and hanging it from a support stand, or by placing it on a piece of cork or wood floating in a bowl of still water.
Allow the magnet to swing freely and come to rest.
The magnet will align itself approximately along the geographic North-South direction.
The end of the magnet that points towards the Earth's geographic North is the magnet's North pole (or North-seeking pole). The other end is the South pole.

8. If the earth is itself a magnet, can you guess the poles of earth's magnet by looking at the direction of the magnetic compass?

Ans :

Yes. A magnetic compass needle is a small magnet, and its end marked as North (N) points towards the Earth's geographic North Pole. Since unlike poles attract, the magnetic pole of the Earth located near the geographic North Pole must be a magnetic South pole. Conversely, the Earth's magnetic pole near the geographic South Pole must be a magnetic North pole.

9. While a mechanic was repairing a gadget using a screw driver, the steel screws kept falling down. Suggest a way to solve the problem of the mechanic on the basis of what you have learnt in this chapter.

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Ans :

The mechanic can temporarily magnetize the steel screwdriver.

Method : Take a permanent magnet. Stroke the screwdriver's shaft repeatedly with one pole (e.g., the North pole) of the magnet, always moving in the same direction (e.g., from handle to tip). Lift the magnet well clear at the end of each stroke before beginning the next. After several strokes, the screwdriver will become a temporary magnet.

Result : The magnetized screwdriver tip will attract the small steel screws, making it easier to hold and position them.

10. Two ring magnets X and Y are arranged as shown in Figure. It is observed that the magnet X does not move down further. What could be the possible reason? Suggest a way to bring the magnet X in contact with magnet Y, without pushing either of the magnets.

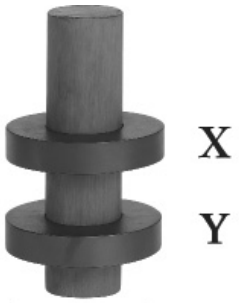

Figure : Two ring magnets

Ans :

Possible Reason : Magnet X floats above magnet Y because the adjacent faces of the two magnets have like poles (both North or both South). The force of repulsion between these like poles is strong enough to counteract the weight of magnet X, causing it to levitate.

Way to bring them together : Flip either magnet X or magnet Y over. This will cause unlike poles to face each other. The force of attraction between the now-facing North and South poles will pull the magnets together, bringing X into contact with Y.

11. Three magnets are arranged on a table in the form of the shape shown in Figure. What is the polarity, N or S, at the ends 1, 2, 3, 4 and 6 of the magnets? Polarity of one end (5) is given for you.

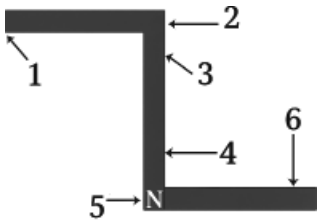

Figure : Three bar magnets

Ans :

We use the principle that touching ends must have opposite polarity for attraction (assuming they are stably arranged). Poles at opposite ends of the same magnet must also be opposite.

1. End 5 is N.
2. End 4 must attract End 5, so End 4 is S.
3. End 3 must attract End 4, so End 3 is N.
4. End 2 is the opposite end of the same magnet as End 3, so End 2 is S.
5. End 1 must attract End 2, so End 1 is N.
6. End 6 is the opposite end of the same magnet as End 4, so End 6 is N.

MULTIPLE CHOICE QUESTION

1. What was the naturally occurring magnetic rock discovered in ancient times called?
(A) Ironstone
(B) Lodestone
(C) Blacks tone
(D) Gravestone

Ans :

(B) Lodestone
Naturally occurring magnets, called lodestones, were discovered in ancient times and formed the foundation for the early understanding and application of magnetism.

2. Which of the following is an example of an artificial magnet?
(A) A piece of wood that attracts iron.
(B) A lodestone found in the earth.
(C) A magnet found in a pencil box.
(D) A stone that points north.

Ans :

(C) A magnet found in a pencil box.

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Artificial magnets are man-made, and examples include magnets found in school laboratories, pencil boxes, stickers, and toys.

3. Why are materials like iron, nickel, and cobalt called magnetic materials?
(A) Because they can be easily broken.
(B) Because they are attracted towards a magnet.
(C) Because they are always shiny.
(D) Because they can float on water.

Ans :

(B) Because they are attracted towards a magnet.
Magnetic materials are defined by their property of being attracted to a magnet. Iron, nickel, and cobalt exhibit this characteristic attraction.

4. What are non-magnetic materials?
(A) Materials that are very heavy.
(B) Materials that are only found in nature.
(C) Materials that are not attracted towards a magnet.
(D) Materials that can become magnets easily.

Ans :

(C) Materials that are not attracted towards a magnet.
Non-magnetic materials are those substances that do not show any attraction when brought near a magnet. Examples include wood, plastic, and glass.

5. When iron filings are spread over a bar magnet, where do most of them stick?
(A) Uniformly all over the magnet.
(B) Only in the middle of the magnet.
(C) Near the ends of the magnet.
(D) Only on one specific end of the magnet.

Ans :

(C) Near the ends of the magnet.
Activity 4.2 demonstrates that iron filings (magnetic material) predominantly stick to the regions near the ends of a bar magnet, indicating these areas have the strongest magnetic force.

6. What are the ends of a magnet where the magnetic force is strongest called?
(A) The edges of the magnet.
(B) The center of the magnet.
(C) The poles of the magnet.
(D) The surfaces of the magnet.

Ans :

(C) The poles of the magnet.
The two ends of a magnet, where the magnetic attraction is concentrated and iron filings tend to cling most, are known as the North pole and the South pole.

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7. What happens if a magnet is broken into smaller pieces?
(A) Each piece becomes a non-magnetic material.
(B) Each piece will have only a North pole or only a South pole.
(C) Each piece will still have both a North pole and a South pole.
(D) The pieces will no longer attract iron filings.

Ans :

(C) Each piece will still have both a North pole and a South pole.
A fundamental property of magnets is that their poles always exist in pairs. Even if a magnet is broken, each resulting smaller piece will have its own North and South pole.

8. If you suspend a bar magnet freely with a thread, in which direction will it generally come to rest?
(A) East-West direction
(B) North-South direction
(C) It will point in any random direction.
(D) It will continuously rotate.

Ans :

(B) North-South direction
A freely suspended magnet aligns itself with the Earth's magnetic field. As a result, it will naturally orient itself to point in a generally North-South direction.

9. What is the end of a freely suspended magnet that points towards the geographic North direction called?
(A) The South-seeking pole or South pole.
(B) The East-seeking pole or East pole.
(C) The North-seeking pole or North pole.
(D) The West-seeking pole or West pole.

Ans :

(C) The North-seeking pole or North pole.
By convention, the end of a freely suspended magnet that aligns itself towards the Earth's geographic North is termed the North-seeking pole, or simply the North pole of the magnet.

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10. What device uses a freely rotating magnetic needle to indicate directions?
(A) A barometer
(B) A thermometer
(C) A magnetic compass
(D) A seismograph
Ans :

(C) A magnetic compass
A magnetic compass is a navigational instrument that contains a magnetized needle. This needle can rotate freely and aligns itself with the Earth's magnetic field to indicate the North-South direction.

11. Why does a freely suspended magnet always rest along the North-South direction?
(A) Due to the gravitational pull of the moon.
(B) Because the Earth itself behaves like a giant magnet.
(C) Due to the influence of the Sun's magnetic field.
(D) Because of air currents in the atmosphere.
Ans :

(B) Because the Earth itself behaves like a giant magnet.
The Earth has its own magnetic field, with magnetic poles near the geographic poles. A freely suspended magnet aligns with this terrestrial magnetic field, causing it to point North-South.

12. How can you make an iron sewing needle into a temporary magnet ?
(A) By heating the needle and then cooling it rapidly.
(B) By rubbing it with a piece of silk cloth.
(C) By repeatedly stroking it with one pole of a permanent magnet in one direction.
(D) By dipping it in saltwater for several hours.
Ans :

(C) By repeatedly stroking it with one pole of a permanent magnet in one direction.
A method of magnetizing an iron needle. This involves consistently stroking the needle along its length with one pole of a bar magnet, always moving in the same direction.

13. What happens when the North pole of one magnet is brought near the South pole of another magnet?
(A) They will repel each other.
(B) They will attract each other.
(C) There will be no interaction between them.
(D) Both magnets will lose their magnetism.
Ans :

(B) They will attract each other.
Unlike poles of magnets (North and South) exert an attractive force on each other. Therefore, when a North pole and a South pole are brought close, they will pull towards each other.

14. What happens when the North pole of one magnet is brought near the North pole of another magnet?
(A) They will attract each other.
(B) They will repel each other.
(C) There will be no interaction.
(D) One magnet will demagnetize the other.
Ans :

(B) They will repel each other.
Like poles of magnets (North and North, or South and South) exert a repulsive force on each other. Thus, when two North poles are brought close, they will push away from each other.

15. What is the surest test to identify if an unknown object is a magnet?
(A) Attraction to an iron object.
(B) Repulsion by another magnet.
(C) Its ability to float on water.
(D) Its color and shape.
Ans :

(B) Repulsion by another magnet.
While magnets attract magnetic materials like iron, an iron object itself will also be attracted to a magnet. However, only another magnet can repel a magnet (when like poles face each other). Thus, repulsion is the definitive test for magnetism.

16. What does the ancient Indian navigational device matsya-yantra consist of?
(A) A copper plate floating in oil.
(B) A magnetized fish-shaped iron piece in a vessel of oil.
(C) A wooden fish that points north.
(D) A lodestone tied to a string.
Ans :

(B) A magnetised fish-shaped iron piece in a vessel of oil.
The matsya-yantra, also known as the machchh-yantra, was an early Indian device similar to a compass. It featured a magnetized iron piece shaped like a fish, which floated in a vessel filled with oil.

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17. Reshma needs to find directions but the sky is overcast, and stars are not visible. She has a device with a freely rotating magnetized needle. What device is Reshma likely using?
(A) A telescope
(B) A weather vane
(C) A magnetic compass
(D) An astrolabe

Ans :

(C) A magnetic compass
The description matches a magnetic compass, which uses a magnetized needle that aligns with the Earth's magnetic field to indicate the North-South direction, aiding navigation when landmarks or stars are not visible.

18. Which of the following materials is NOT a magnetic material?
(A) Iron (B) Nickel
(C) Cobalt (D) Wood

Ans :

(D) Wood
Iron, nickel, and cobalt are metals that are attracted to magnets and are thus classified as magnetic materials. Wood is a non-magnetic material as it is not attracted by magnets.

19. **Assertion (A) :** A freely suspended bar magnet always aligns itself in the North-South direction.
Reason (R) : The Earth has its own magnetic field that influences the magnet.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
The Earth acts like a large magnet with its own magnetic poles. This terrestrial magnetic field exerts a force on any freely suspended magnet, causing it to align along the North-South direction.

20. Consider the following statements about magnets:
1. Like poles of magnets attract each other.
2. A single magnetic pole (North or South) can exist independently.
3. The ends of a magnet where attraction is strongest are called poles.
Which of the above statements is/are correct?
(A) 1 only
(B) 3 only
(C) 1 and 2 only
(D) 2 and 3 only

Ans :

(B) 3 only
Like poles repel, not attract. Magnetic poles always exist in pairs. The ends of a magnet, where the magnetic effect is most concentrated, are indeed called its poles. Therefore, only statement 3 is correct.

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21. In Activity 4.1, where students test various objects with a magnet, what is the purpose of predicting whether an object will stick before testing?
(A) To make the activity longer.
(B) To engage prior knowledge and form a hypothesis.
(C) To ensure all objects stick to the magnet.
(D) To practice writing skills.

Ans :

(B) To engage prior knowledge and form a hypothesis.
Asking for a prediction encourages students to think about the properties of materials and magnets before conducting the experiment, which is a key part of the scientific inquiry process (forming a hypothesis).

22. If you place a sheet of paper between a magnet and a magnetic compass, what happens to the deflection of the compass needle?
(A) The needle stops deflecting completely.
(B) The deflection increases significantly.
(C) There is no appreciable change in the deflection.
(D) The paper itself becomes magnetized.

Ans :

(C) There is no appreciable change in the deflection.
Magnetic force can act through non-magnetic materials like paper, wood, or glass. Therefore, placing paper between the magnet and compass does not significantly block the magnetic effect.

23. What are magnets called that are made from pieces of iron or other materials by people, as opposed to those found naturally?
(A) Lodestones
(B) Natural magnets
(C) Artificial magnets
(D) Temporary magnets

Ans :

(C) Artificial magnets
The differentiates between natural lodestones and human-made magnets, known as artificial magnets, which are typically made from materials like iron.

24. What is one way to properly store bar magnets to preserve their magnetism?
(A) Keep them isolated and far apart from each other.
(B) Store them in pairs with unlike poles on the same side, separated by wood and with soft iron keepers.
(C) Heat them regularly to maintain their strength.
(D) Store them near electronic devices to enhance their magnetic field.

Ans :

(B) Store them in pairs with unlike poles on the same side, separated by wood and with soft iron keepers.
The More to know! section on keeping magnets safe advises storing them in pairs with unlike poles adjacent, using a wooden separator and soft iron pieces (keepers) across their ends.

25. What is the primary difference in interaction when an iron bar is brought near a magnet versus when another magnet is brought near it?
(A) The iron bar will always repel the magnet.
(B) The iron bar will be attracted by both poles of the magnet; another magnet can be repelled.
(C) The iron bar will only be attracted to the North pole of the magnet.
(D) The iron bar will become a permanent magnet instantly.

Ans :

(B) The iron bar will be attracted by both poles of the magnet; another magnet can be repelled.
A magnetic material like an iron bar will be attracted to either pole of a magnet. However, when two magnets interact, they can either attract (unlike poles) or repel (like poles).

26. Which of these actions is NOT recommended for keeping magnets safe and maintaining their magnetism?
(A) Storing them with keepers.
(B) Avoiding dropping them.
(C) Heating them to a high temperature.
(D) Keeping them away from mobile phones.

Ans :

(C) Heating them to a high temperature.
Heating, dropping, or hammering magnets can weaken or completely destroy their magnetism, so these actions should be avoided.

27. A student makes a toy car by attaching a bar magnet to a matchbox. If they bring another similar toy car (with a magnet) close, and the cars push each other away, what can be concluded about the magnets?
(A) The magnets are very weak.
(B) Like poles of the magnets are facing each other.
(C) Unlike poles of the magnets are facing each other.
(D) One of the magnets is not a true magnet.

Ans :

(B) Like poles of the magnets are facing each other.
Repulsion between the two toy cars indicates that the magnets attached to them are oriented such that their like poles (e.g., North facing North, or South facing South) are directed towards each other.

28. **Assertion (A) :** A magnetic compass needle is itself a small magnet.
Reason (R) : When another magnet is brought near a compass, the needle deflects due to magnetic attraction or repulsion.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
The needle of a magnetic compass is indeed a small, pivoted magnet. Its deflection when another magnet is brought close is a direct result of the forces of attraction (between unlike poles) or repulsion (between like poles).

29. Which of the following materials are likely to be attracted by a magnet?
1. A plastic ruler
2. A steel paperclip
3. A cobalt pin

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(A) 1 only
(B) 2 only
(C) 2 and 3 only
(D) 1, 2, and 3

Ans :

(C) 2 and 3 only
Steel (which contains iron) and cobalt are magnetic materials and will be attracted to a magnet. Plastic is a non-magnetic material.

30. A recycling facility needs to separate iron and steel items from a large pile of mixed waste containing plastic, wood, and glass.
Which property of magnets would be most useful for this task?
(A) The ability of magnets to float.
(B) The fact that magnets have two poles.
(C) The attraction of magnets to iron and steel.
(D) The fact that magnets repel each other.

Ans :

(C) The attraction of magnets to iron and steel.
Magnets attract ferromagnetic materials like iron and steel. This property can be utilized in recycling by using powerful magnets (often electromagnets on cranes) to lift and separate these metals from non-magnetic waste materials.

31. In the story, what did Reshma learn that sailors used in olden days, besides stars, to find directions, especially during storms?
(A) The position of the sun during the day.
(B) A device known as a magnetic compass.
(C) The direction of ocean currents.
(D) The flight patterns of birds.

Ans :

(B) A device known as a magnetic compass.
Reshma's research in the story revealed that sailors in the past used a magnetic compass for navigation, especially when celestial bodies like stars were not visible due to weather conditions.

32. If you have a bar magnet and an identical looking iron bar, how can you distinguish the magnet from the iron bar using only these two items?
(A) By checking which one is heavier.
(B) By trying to attract paper pieces with both.
(C) By seeing if one can repel an end of the other; only magnets can repel.
(D) By observing their color and texture.

Ans :

(C) By seeing if one can repel an end of the other; only magnets can repel.
An iron bar will be attracted to both poles of the magnet. However, if one bar can repel an end of the other bar, then both must be magnets (as repulsion only occurs between like poles of two magnets).

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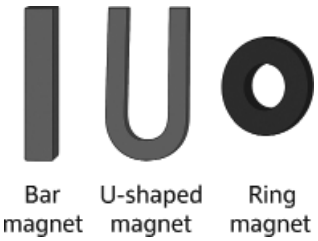
33. Which of the following is a common shape for artificial magnets shown in Figure ?



(A) Spherical magnet
(B) U-shaped magnet
(C) Pyramidal magnet
(D) Cubical magnet

Ans :

(B) U-shaped magnet
Figure illustrates various common shapes of artificial magnets, including bar magnets, U-shaped magnets, and ring magnets. Spherical is also shown, but U-shaped is a prominent example.

34. When making your own compass with a magnetized needle and a cork floating in water (Activity 4.4), what does the needle indicate when it comes to rest?
(A) The direction of the nearest metallic object.
(B) The East-West direction.
(C) The North-South direction.
(D) The direction of the strongest light source.

Ans :

(C) The North-South direction.
The magnetized needle, when allowed to float freely on the cork, acts like a compass needle and aligns itself with the Earth's magnetic field, pointing in the North-South direction.

35. What is the difference between how iron filings stick to the poles versus the middle of a bar magnet?
(A) More filings stick to the middle than the poles.
(B) Filings stick uniformly all over the magnet.
(C) Maximum filings stick near the poles, very few in the middle.
(D) Filings only stick to the North pole, not the South pole or middle.

Ans :

(C) Maximum filings stick near the poles, very few in the middle.
The magnetic force of a bar magnet is concentrated at its poles. Consequently, iron filings (which are attracted by magnetic force) will cling most densely to the North and South poles, with minimal attraction in the middle section.

36. All the following are described as common items that might have magnets attached to them EXCEPT:
(A) Pencil boxes
(B) Stickers
(C) Wooden chairs
(D) Refrigerator doors (implicitly, as stickers are mentioned)

Ans :

(C) Wooden chairs
Magnets in pencil boxes, stickers (often for refrigerators), and toys. Wooden chairs are generally not made with magnetic components for their primary function.

37. A student has two bar magnets, A and B. When the North pole of A is brought near one end of B, they attract. What can be said about that end of magnet B?
(A) It is definitely a North pole.
(B) It is definitely a South pole.
(C) It could be either a North or South pole.
(D) It is non-magnetic.

Ans :

(B) It is definitely a South pole.
Attraction occurs between unlike poles. Since the North pole of magnet A attracts that end of magnet B, that end of magnet B must be a South pole.

38. **Assertion (A) :** Magnetic materials like iron are attracted to a magnet.
Reason (R) : Non-magnetic materials like plastic are also attracted to a magnet.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(C) A is true, but R is false.
Magnetic materials such as iron are indeed attracted to magnets. However, non-magnetic materials like plastic do not exhibit this attraction.

39. Which statements are true about the poles of a magnet?
1. A magnet has a North pole and a South pole.
2. The magnetic strength is weakest at the poles.
3. If a magnet is cut in half, each half will have only one pole.

(A) 1 only
(B) 2 only
(C) 1 and 3 only
(D) None of the above

Ans :

(A) 1 only
A magnet indeed has a North and a South pole. Magnetic strength is strongest at the poles, not weakest. If cut, each half will still have both a North and a South pole. So, only statement 1 is true.

40. During a science fair, a student demonstrates that a magnet can make a steel paperclip jump up from a table without touching it.
This demonstrates which property of magnets?
(A) Magnets can only attract objects through direct contact.
(B) Magnetic force can act at a distance.
(C) Paperclips are not made of magnetic material.
(D) Magnets lose their power if not touching objects.

Ans :

(B) Magnetic force can act at a distance.
The ability of the magnet to lift the paperclip without physical contact shows that the magnetic force extends into the space around the magnet and can influence magnetic objects within that field, acting at a distance.

MATCHING TYPE QUESTION

41. Match the type of material in Column A with its behavior towards a magnet in Column B:

	Column A		**Column B**
1.	Magnetic Material	A.	Example: Wood, Plastic

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2.	Non-magnetic Material	B.	Always has a North and a South pole
3.	Iron Filings	C.	Attracted towards a magnet (e.g., Iron)
4.	Bar Magnet	D.	Stick most to the poles of a magnet

(a) 1-C, 2-A, 3-D, 4-B
(b) 1-A, 2-C, 3-B, 4-D
(c) 1-C, 2-D, 3-A, 4-B
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(a) 1-C, 2-A, 3-D, 4-B
Magnetic materials like iron are attracted to magnets. Non-magnetic materials like wood are not. Iron filings show magnetic field lines, concentrating at poles. Bar magnets always have two poles.

42. Match the property or behavior of a magnet in Column A with its correct description in Column B:

	Column A		**Column B**
1.	Poles of a Magnet	A.	North pole of one repels North pole of another
2.	Freely Suspended Magnet	B.	Regions where magnetic strength is strongest
3.	Like Poles Interaction	C.	North pole of one attracts South pole of another
4.	Unlike Poles Interaction	D.	Aligns itself in the North-South direction

(a) 1-D, 2-B, 3-A, 4-C
(b) 1-B, 2-D, 3-C, 4-A
(c) 1-B, 2-D, 3-A, 4-C
(d) 1-A, 2-C, 3-B, 4-D

Ans :

(c) 1-B, 2-D, 3-A, 4-C
Magnetic poles are where attraction is strongest. A freely suspended magnet aligns North-South. Like poles repel each other. Unlike poles attract each other.

43. Match the device or concept related to magnetism in Column A with its function or principle in Column B:

	Column A		**Column B**
1.	Magnetic Compass	A.	Natural magnet discovered in ancient times
2.	Lodestone	B.	Stroking an iron needle repeatedly with a magnet
3.	Making a Magnet	C.	Earth behaving like a giant magnet
4.	Magnet's Directive Property	D.	Device with a pivoted magnetic needle to show North-South

(a) 1-C, 2-A, 3-D, 4-B
(b) 1-D, 2-B, 3-A, 4-C
(c) 1-A, 2-D, 3-B, 4-C
(d) 1-D, 2-A, 3-B, 4-C

Ans :

(d) 1-D, 2-A, 3-B, 4-C
A magnetic compass uses a needle to show directions. Lodestone is a natural magnet. Magnets can be made by stroking. A magnet's N-S alignment is due to Earth's magnetism.

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44. Match the scenario involving magnets in Column A with the observed effect in Column B:

	Column A		**Column B**
1.	Bringing North pole near North pole	A.	Iron bar is attracted
2.	Bringing North pole near an iron bar	B.	Compass needle deflects even with wood in between
3.	Breaking a bar magnet into two pieces	C.	Repulsion occurs
4.	Placing wood between a magnet and compass	D.	Each piece becomes a new magnet with North and South poles

(a) 1-A, 2-C, 3-D, 4-B
(b) 1-C, 2-D, 3-A, 4-B
(c) 1-C, 2-A, 3-D, 4-B
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(c) 1-C, 2-A, 3-D, 4-B

Like poles repel. A magnet attracts an iron bar. Broken magnet pieces form new magnets. Magnetic effect passes through non-magnetic materials like wood.

45. Match the magnet shape or type in Column A with a characteristic or related item in Column B:

	Column A		**Column B**
1.	Bar Magnet	A.	Used by sailors for navigation in olden days
2.	U-shaped Magnet	B.	A common artificial magnet shape, rectangular
3.	Ring Magnet	C.	Often used in pencil boxes to keep them closed
4.	Magnetic Compass (ancient)	D.	Poles are at the two ends of the U

(a) 1-D, 2-B, 3-A, 4-C
(b) 1-B, 2-A, 3-C, 4-D
(c) 1-B, 2-D, 3-C, 4-A
(d) 1-C, 2-D, 3-B, 4-A

Ans :

(c) 1-B, 2-D, 3-C, 4-A
A bar magnet is rectangular. U-shaped magnets have poles at the ends of the U. Ring magnets are often used in closures. Ancient compasses aided sailors.

46. Match the unit of length in Column A with its correct relationship or typical use in Column B:

	Column A		**Column B**
1.	Metre (m)	A.	Used for measuring very long distances
2.	Centimeter (cm)	B.	$1/100^{th}$ of a metre, marked on a school ruler
3.	Millimeter (mm)	C.	SI unit of length
4.	Kilometre (km)	D.	$1/10^{th}$ of a centimeter, smallest division on ruler

(a) 1-C, 2-B, 3-D, 4-A
(b) 1-B, 2-C, 3-A, 4-D
(c) 1-C, 2-D, 3-B, 4-A
(d) 1-A, 2-B, 3-D, 4-C

Ans :

(a) 1-C, 2-B, 3-D, 4-A
Metre is the SI unit of length. Centimeter is $1/100^{th}$of a metre. Millimeter is $1/10^{th}$ of a centimeter. Kilometre is used for long distances like between cities.

VERY SHORT QUESTION

47. What device did sailors use in olden days to find directions when stars were not visible?

Ans :

Sailors used a magnetic compass.

48. What were the naturally occurring magnets, discovered in ancient times, known as?

Ans :

Naturally occurring magnets were known as lodestones.

49. Name one common shape of an artificial magnet.

Ans :

Bar magnet (or U-shaped magnet, Ring magnet).

50. What are materials that are attracted to a magnet called?

Ans :

Materials attracted to a magnet are called magnetic materials.

51. Give an example of a magnetic material other than iron.

Ans :

Nickel (or Cobalt).

52. What are materials that are not attracted towards a magnet called?

Ans :

Materials not attracted towards a magnet are called non-magnetic materials.

53. Where on a bar magnet do most iron filings stick?

Ans :

Most iron filings stick near the ends of the bar magnet.

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54. What are the ends of a magnet called?

Ans :

The ends of a magnet are called its poles.

55. How many poles does a magnet have?

Ans :

A magnet has two poles.

56. Can a single magnetic pole exist on its own?

Ans :

No, a single magnetic pole cannot exist on its own; poles always exist in pairs.

57. In which direction does a freely suspended magnet come to rest?

Ans :

A freely suspended magnet comes to rest along the north-south direction.

58. What is the end of the magnet that points towards the north direction called?

Ans :

It is called the North-seeking pole or the North pole.

59. Why does a freely suspended magnet align itself in the north-south direction?

Ans :

It aligns this way because our Earth itself behaves like a giant magnet.

60. What is the shape of the magnet typically found inside a magnetic compass?

Ans :

The magnet inside a magnetic compass is typically in the shape of a needle.

61. What was the ancient Indian device for navigation at sea, consisting of a magnetised fish-shaped iron piece, called?

Ans :

It was called matsya-yantra (or machchh-yantra).

62. What happens when the North pole of one magnet is brought near the South pole of another magnet?

Ans :

The unlike poles will attract each other.

63. What happens when the North pole of one magnet is brought near the North pole of another magnet?

Ans :

The like poles will repel each other.

64. Can the magnetic effect pass through a sheet of wood?

Ans :

Yes, the magnetic effect can act through non-magnetic materials like wood.

65. Name one way a magnet can lose its properties if not handled with care.

Ans :

Heating the magnet (or dropping it, hammering it).

66. How should bar magnets be stored in pairs to keep them safe?

Ans :

They should be stored with unlike poles on the same side, with a piece of wood in between and soft iron across the ends.

SHORT ANSWER QUESTION

67. How were magnets discovered?

Ans :

Magnets were first discovered as naturally occurring stones called lodestones in ancient times. Later, people learned to make magnets from iron pieces.

68. Differentiate between natural and artificial magnets. Give one example of an artificial magnet.

Ans :

Natural magnets like lodestone occur naturally. Artificial magnets are man-made from materials like iron. An example is a bar magnet used in labs.

69. List three common shapes of magnets mentioned in the chapter.

Ans :

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Three common shapes of magnets are bar magnet, U-shaped magnet, and ring magnet. These are all types of artificial magnets we use.

70. Explain what magnetic materials are, providing two examples.

Ans :

Magnetic materials are those substances that get attracted towards a magnet. Iron is a common example; nickel and cobalt are also magnetic materials.

71. Explain what non-magnetic materials are, providing two examples from daily life.

Ans :

Non-magnetic materials are substances that are not attracted towards a magnet. Examples include wood, plastic, rubber, and glass commonly found around us.

72. Describe what happens when iron filings are spread near a bar magnet. What does this indicate?

Ans :

When iron filings are spread near a bar magnet, most of them stick to the ends of the magnet. This indicates that the magnetic strength is concentrated at these ends, called poles.

73. What are the two poles of a magnet named? What happens if a magnet is broken into two pieces?

Ans :

The two poles are named the North pole and the South pole. If a magnet is broken, each piece becomes a complete magnet with both North and South poles.

74. Why does a freely suspended bar magnet always point in a particular direction?

Ans :

A freely suspended bar magnet aligns itself in the Earth's north-south direction because the Earth itself behaves like a giant magnet with its own magnetic poles.

75. How is the property of a magnet to align north-south used in a magnetic compass?

Ans :

A magnetic compass has a freely rotating magnetic needle. This needle always aligns with the Earth's north-south direction, thus indicating directions to the user.

76. Briefly describe the construction of a simple magnetic compass as shown in the chapter.

Ans :

A magnetic compass is a small box with a transparent cover, containing a magnetized needle pivoted to rotate freely. A dial with directions is marked below the needle.

77. How can you make an iron sewing needle into a temporary magnet using a bar magnet?

Ans :

Stroke the iron needle with one pole of a bar magnet repeatedly in one direction, lifting the magnet after each stroke. Repeat 30-40 times.

78. What is the matsya-yantra that was used by ancient Indian sailors?

Ans :

Matsya-yantra was an ancient Indian navigational device. It consisted of a magnetized fish-shaped iron piece kept in a vessel of oil to find directions at sea.

79. State the rule of attraction and repulsion between magnetic poles.

Ans :

Unlike poles of two magnets (North-South) attract each other, while like poles (North-North or South-South) repel each other. This interaction is fundamental.

80. How can the property of repulsion be used to identify if an object is a magnet or just a magnetic material like iron?

Ans :

A magnet will attract a magnetic material and can also repel another magnet if like poles face each other. Repulsion is the sure test for a magnet.

81. What happens to a compass needle when the North pole of a bar magnet is brought near the North pole of the compass needle?

Ans :

The North pole of the compass needle will move away, or be repelled, because like poles (North and North) repel each other.

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82. What did the investigation with placing wood, cardboard, or plastic between a magnet and a compass needle conclude?

Ans :

The investigation concluded that the magnetic effect can pass through non-magnetic materials like wood, cardboard, or plastic without significantly affecting the compass needle's deflection.

83. How are the North and South poles sometimes indicated on magnets if they are not labelled N and S?

Ans :

The North pole might be indicated by a white dot or painted red, while the South pole might be painted blue on some magnets.

84. List two precautions that should be taken to prevent magnets from losing their properties.

Ans :

Magnets should not be heated, dropped, or hammered. They should also be kept away from mobile phones or remote controls to preserve their magnetism.

85. How should two bar magnets be stored to keep them safe and maintain their magnetism?

Ans :

Two bar magnets should be stored in pairs with their unlike poles on the same side, separated by a piece of wood, and with pieces of soft iron across their ends.

86. Why is it said that a single North pole or a single South pole cannot exist?

Ans :

Magnetic poles always exist in pairs. Even if a magnet is broken into the smallest pieces, each piece will still have both a North and a South pole.

LONG ANSWER QUESTION

87. Describe how ancient sailors used stars for navigation and what difficulty they faced during storms. How did the invention of the magnetic compass help them?

Ans :

Ancient sailors used the position of stars, like the Pole Star, to determine directions at night. During storms with overcast skies, stars were not visible, making navigation difficult. The magnetic compass, with its needle always pointing north-south, provided a reliable way to find directions regardless of weather conditions.

88. Explain the difference between magnetic and non-magnetic materials with suitable examples. How can you test if a given material is magnetic or non-magnetic using a bar magnet?

Ans :

Magnetic materials (e.g., iron, nickel) are attracted to a magnet, while non-magnetic materials (e.g., plastic, wood) are not. To test, bring a bar magnet near the material. If the material sticks to the magnet, it is magnetic; if it does not, it is non-magnetic.

89. What are magnetic poles? Describe an experiment using iron filings to show the location of poles on a bar magnet. What do you observe about the distribution of filings?

Ans :

Magnetic poles are the regions at the ends of a magnet where its attractive strength is greatest. If you spread iron filings on paper and place a bar magnet over them, the filings will cluster most densely at the two ends, indicating these are the poles. Fewer filings stick to the middle.

90. Explain the directive property of a magnet. How does this property help us find directions? Why does a piece of iron not show this property?

Ans :

The directive property is that a freely suspended magnet always aligns itself in the Earth's geographic north-south direction. The end pointing north is the North pole, and the end pointing south is the South pole. This helps in navigation. A piece of iron doesn't show this because it isn't permanently magnetized.

91. Describe the steps to make your own simple magnetic compass using an iron sewing needle, a cork, a bar magnet, and a bowl of water.

Ans :

First, magnetize the iron sewing needle by stroking it 30-40 times with one pole of a bar magnet in

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a single direction. Then, pass this magnetized needle horizontally through a small cork piece. Float this cork in a bowl of water. The needle will align itself north-south, acting as a compass.

92. Explain the phenomenon of attraction and repulsion between magnets. Why is repulsion considered a surer test for magnetism than attraction?

Ans :

When magnets are brought close, unlike poles (N-S) attract each other, while like poles (N-N or S-S) repel each other. Repulsion is a surer test because a magnet can attract a magnetic material (like iron), but it will only repel another magnet when their like poles face each other.

93. Imagine you have two identical bars, one is a magnet and the other is a simple iron bar. How would you identify which one is the magnet without using any other object?

Ans :

Suspend each bar freely from its center. The bar that consistently comes to rest in the north-south direction is the magnet. The iron bar will come to rest in any random direction. This uses the directive property of magnets for identification.

94. You are given a bar magnet with its poles unmarked. How would you locate its North and South poles using the Earth's magnetic field?

Ans :

Suspend the bar magnet freely using a thread tied at its center so it can rotate horizontally. Allow it to come to rest. The end of the magnet that points towards the Earth's geographic North direction is the magnet's North pole, and the opposite end is its South pole.

95. Describe three ways in which magnets can lose their magnetic properties. Why is it important to store magnets properly?

Ans :

Magnets can lose their properties if they are heated strongly, hammered vigorously, or dropped from a height repeatedly. Storing magnets properly, often with keepers, helps maintain their magnetism for a longer time and prevents them from weakening due to self-identification or external influences.

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96. The Earth behaves like a giant magnet. If a compass needle's North pole points towards the geographic North, what can you infer about the polarity of the Earth's magnetic pole located near the geographic North Pole?

Ans :

Since the North pole of a compass needle (which is itself a magnet) is attracted towards the Earth's geographic North, it implies that the Earth's magnetic pole located near the geographic North Pole must actually be a magnetic South pole (as unlike poles attract).

CASE BASED QUESTION

97. During a science fair, a student demonstrated that when two toy cars, each with a bar magnet attached, were brought close, they sometimes moved towards each other and sometimes moved away without any push. The magnets were hidden inside the cars.

(i) What magnetic property causes the cars to move towards each other?

(ii) What magnetic property causes the cars to move away from each other?

(iii) If the rear of Car A attracts the front of Car B, what can you say about the poles at the rear of Car A and front of Car B?

Ans :

(i) The cars move towards each other due to the attraction between unlike poles of the magnets hidden inside them.

(ii) The cars move away from each other due to the repulsion between like poles of the magnets hidden inside them.

(iii) If they attract, the rear of Car A and the front of Car B must have unlike poles (e.g., North and South, or South and North).

98. A factory uses a large electromagnet on a crane to lift and move heavy scrap iron. The crane operator can pick up the scrap and then release it into a different container by controlling the electromagnet.

(i) What type of material is scrap iron that allows it to be lifted by a magnet?

(ii) How does an electromagnet differ from a permanent magnet like a lodestone, especially regarding its magnetic property?

(iii) Why is an electromagnet more suitable for this task than a strong permanent magnet? (Evaluating)

Ans :

(i) Scrap iron is a magnetic material.
(ii) An electromagnet's magnetism can be turned on and off by controlling electricity, while a permanent magnet like lodestone has constant magnetism.
(iii) An electromagnet is more suitable because its magnetic force can be switched off, allowing the crane to easily release the scrap iron.

99. Reshma found an old box containing several sewing needles and a bar magnet. She noticed some needles stuck to the magnet, while others nearby were also slightly attracted to those already stuck, forming a short chain.
(i) Why do the sewing needles stick to the bar magnet?
(ii) How do the needles already stuck to the magnet attract other needles?
(iii) If Reshma removes the bar magnet, will the chain of needles likely stay together strongly? Why or why not?

Ans :

(i) Sewing needles stick to the bar magnet because they are made of steel (which contains iron), a magnetic material that gets attracted to magnets.
(ii) The needles stuck to the magnet become temporary magnets themselves through magnetic induction, allowing them to attract other nearby needles.
(iii) The chain of needles will likely fall apart or stick together very weakly because the needles are only temporary magnets; their magnetism is induced by the permanent magnet.

100. A student is trying to find the direction in a closed room with no windows. She has a bar magnet, a piece of thread, and a non-metallic stand. She suspends the magnet freely from the stand.
(i) In which direction will the freely suspended bar magnet align itself?
(ii) How can she identify the North pole of her magnet once it settles?
(iii) What scientific principle is she using to find the direction?

Ans :

(i) The freely suspended bar magnet will align itself in the north-south direction.
(ii) Once it settles, the end of the magnet pointing towards the Earth's geographic North is its North pole.
(iii) She is using the directive property of magnets, which states that a freely suspended magnet aligns with the Earth's magnetic field.

101. A shopkeeper keeps a device near the exit that beeps if someone tries to take an item with a special magnetic tag without paying. The tag is deactivated by the cashier upon payment.
(i) What property of magnets is likely being used by the deactivation device at the cashier?
(ii) Why would a simple piece of iron not work as this special security tag?
(iii) What might happen if a customer brings a strong personal magnet near an active tag before reaching the cashier? (Evaluating)

Ans :

(i) The deactivation device likely uses a strong magnetic field or specific magnetic pulses to alter or demagnetize the special tag.
(ii) A simple piece of iron would be attracted to any magnet and wouldn't have a specific state that can be deactivated to prevent the alarm.
(iii) A strong personal magnet might interfere with the tag, potentially damaging it, deactivating it unintentionally, or even triggering the alarm prematurely depending on the system's design.

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CHAPTER 5

MEASUREMENT OF LENGTH AND MOTION

SUMMARY

1. HOW DO WE MEASURE?

1.1 Introduction to Measurement

The chapter starts with Deepa needing a new uniform and observing different measurement tools (metal rod, tailor's tape) and non-standard units (like char angula or four fingers width) being used.

Table : Measuring the length of the table

Name of the Student	Number of Handspans
Anish	Slightly more than 13
Padma	13
Tasneem	Slightly less than 13
Deepa	Between 13 and 14
Hardeep	14

1.2 Non-Standard Units

Discusses historical and informal methods of measuring length using body parts like arm length, strides, feet length, and handspan (balisht).

1.3 Inconsistency of Non-Standard Units

An activity measuring a table using handspans demonstrates that measurements vary because body parts differ in size from person to person.

1.4 Need for Standard Units

This inconsistency highlights the need for standard units so that measurements of the same length are consistent regardless of who measures it.

1.5 Measurement Components

A measurement consists of a number and a unit (e.g., 13 hands pans).

2. STANDARD UNITS

2.1 Historical Context

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Mentions ancient Indian units like angula, dhanusa and yojana used historically. Harappan civilization sites show evidence of scales.

2.2 SI Units

Due to confusion caused by different measurement systems globally, the International System of Units (SI) was adopted.

2.3 Metre (m)

The SI unit of length is the metre. 1 metre is divided into 100 centimeters (cm).

2.4 Centimeter (cm) & Millimeter (mm)

A centimeter is further divided into 10 millimeters (mm). 1 cm=10 mm. 1 mm is the smallest length typically measurable on a standard 15-cm scale.

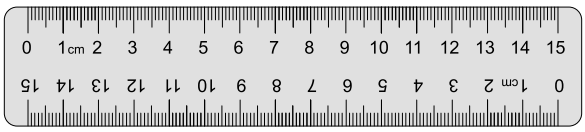

Figure : A 15-cm scale

2.5 Kilometre (km)

Used for larger distances. 1 km=1000 m.

2.6 Other Units

Mentions inches (1 inch=2.54 cm) and feet as older units still sometimes used.

3. CORRECT WAY OF MEASURING LENGTH

3.1 Choosing Appropriate Scale

Use a scale suitable for the length being measured (e.g., 15-cm scale for a pencil, metre scale/tape for a room, flexible tape for curved surfaces like chest size or tree girth).

3.2 Placing the Scale

The scale should be placed in contact with the object, along its length and not tilted.

3.3 Eye Position

The eye should be positioned directly above the mark being read to avoid parallax error.

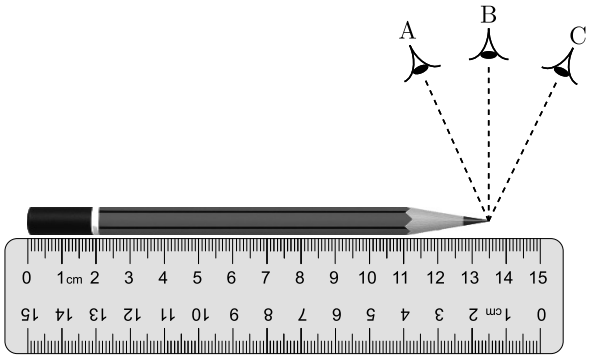

Figure : Correct position of the eye is 'B'

3.4 Using Broken Scales

If the zero mark is damaged, start measuring from another full mark (e.g., 1.0 cm) and subtract this starting value from the final reading.

3.5 Accessibility

Visually challenged individuals use scales with raised markings.

3.6 Writing Conventions

Units (km, m, cm, mm) start lowercase (unless at the start of a sentence), symbols are lowercase, no 's' for plural, no full stop after symbol (unless at end of sentence), and a space is left between the number and the unit.

4. MEASURING THE LENGTH OF A CURVED LINE

The length of a curved line (like decorative lights on an arch or the boundary of a leaf) can be measured using a flexible measuring tape or by laying a thread along the curve, then straightening the thread and measuring its length against a standard scale.

Figure : Measuring the length of a curved line

5. DESCRIBING POSITION

5.1 Reference Point

To describe the position of an object or measure distance consistently, a fixed object or point, known as a reference point, is needed. Examples include using a bus stand to compare distances to school and a garden, or using Delhi as a reference point on kilometre stones.

5.2 Changing Position

An object's position relative to a reference point changes over time if the object is moving.

6. MOVING THINGS

6.1 Motion

An object is in motion if its position changes with time relative to a reference point.

6.2 Rest

An object is at rest if its position does not change with time relative to a reference point.

6.3 Relativity of Motion

Whether an object is perceived as at rest or in motion depends on the chosen reference point. Passengers on a bus are at rest relative to the bus but in motion relative to objects outside the bus.

7. TYPES OF MOTION

7.1 Linear Motion

Motion along a straight line (e.g., object dropped, car on a straight road, march-past).

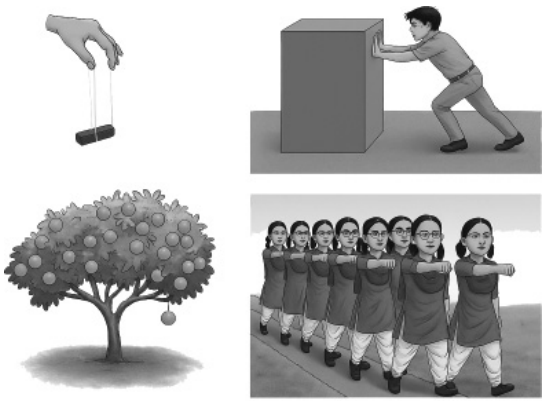

Figure : Linear motion

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7.2 Circular Motion

Motion along a circular path (e.g., eraser whirled on a thread, merry-go-round).

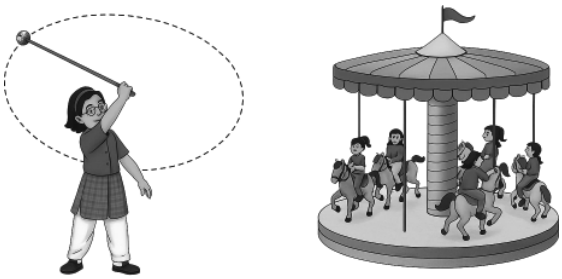

Figure : Circular motion

7.3 Oscillatory Motion

Motion that repeats back and forth (to and fro) about a fixed position (e.g., eraser hanging on a thread and swung, swing, metal strip fixed at one end and vibrated).

Figure : Oscillatory motion

7.4 Periodic Motion

Any motion that repeats itself after a fixed interval of time. Both circular and oscillatory motions are types of periodic motion.

NCERT ACTIVITY

Activity 5.1 : Let us measure

1. Select some objects around you, such as a comb, a pen, a pencil, and an eraser to measure their lengths.
2. Measure their lengths one by one using a metre scale and note down the measurements in Table.

Table : Measuring lengths

Object	Length of the object

Ans :

Choose objects like a comb, pen, pencil, eraser, etc.
Use a ruler or metre scale to measure the length of each object carefully.

Object	Length of the object
Comb	18.5 cm
Pen	14.0 cm
Pencil	16.2 cm
Eraser	4.1 cm

Activity 5.2 : Let us explore

1. Look around and prepare a list of five objects that are in motion and five objects that are at rest.
2. Record your observations in Table.
3. Think about how you decided whether an object was in motion or at rest. Write your explanation (justification) in Table.

Table : Observing things around you

Objects in motion	Justification	Objects at rest	Justification
Cow grazing in the field		Tree	

Ans :

To complete the activity:
1. Look around you (e.g., in your room, outside the window).
2. Identify five things that are changing their position over time (in motion).
3. Identify five things that are not changing their position over time relative to their immediate surroundings (at rest).
4. For each object, explain why you classified it as being in motion or at rest. The justification should relate to whether its position is changing with time compared to a reference point (like the ground, a building, a table etc.).

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Example of a Completed Table (Your observations and justifications should be based on what you see):

Objects in motion	Justification	Objects at rest	Justification
Cow grazing in the field	Its position changes relative to the ground/tree.	Tree	Its position does not change relative to the ground.
A flying bird	Its position changes relative to the sky/buildings.	A parked car	Its position does not change relative to the road/ ground.
A person walking	Their position changes relative to the path/ buildings.	A house	Its position does not change relative to the ground.
Blades of a moving fan	Their positions are continuously changing.	A table	Its position does not change relative to the floor.
A car driving on road	Its position changes relative to the road/trees/ buildings.	A book on a table	Its position does not change relative to the table.

Activity 5.3 : Let us explore

1. Take an eraser and drop it from a certain height.
2. Observe its motion.

Does it move along a straight line? When an orange drops from the tree, does it move in a straight line? Have you seen the Republic Day parade? Recall the march-past of students during the parade. Do they move on a straight-line path? When a heavy box is pushed, it may also move along a straight line (Figure).

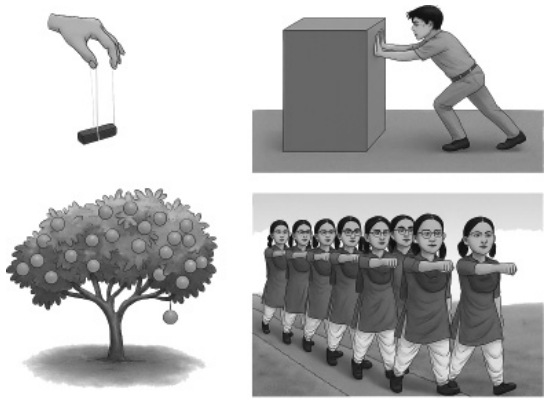

Figure : Linear motion

Ans :

1. Yes, it moves along a straight line (vertically downwards).
2. Falling Orange : Yes, like the eraser, it falls straight down from the tree.
3. Marching Students : Yes, during a march-past, students typically move forward along a straight path.
4. Pushed Box : Yes, if pushed straight on a flat surface, the box moves along a straight line.

Activity 5.4 : Let us investigate

1. Tie an eraser (or a potato) to one end of a thread.
2. Hold the other end of the thread with your hand and whirl it (Figure).
3. Observe its motion.

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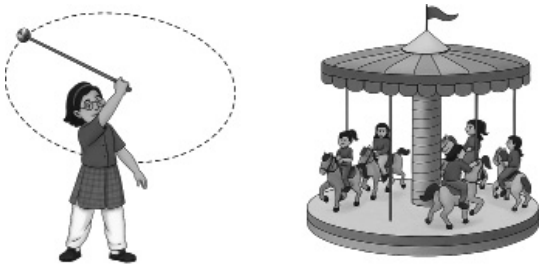

Figure : Circular motion

Is the motion of the eraser the same as that of a merry-go-round?

When an object moves along a circular path, its motion is called circular motion.

Ans :

1. Observation : When you hold the thread and whirl the eraser, you will observe that the eraser moves in a circle around your hand. Its path is circular.
2. Yes, the motion of the whirled eraser is the same type of motion as that of a merry-go-round (specifically, a point or horse on the merry-go-round). Both the eraser and the parts of the merry-go-round move along a circular path.

Activity 5.5 : Let us investigate

1. Tie an eraser (or a potato) to one end of a thread.
2. Hang the eraser by holding the other end of the thread (Figure). Keep your hand steady.
3. Using the other hand, take the eraser slightly to one side and then release (Figure).

Does it start moving to and fro? Is its motion similar to the motion of a swing?

When an object moves to and fro about some fixed position, its motion is called oscillatory motion.

Figure : Oscillatory motion

Observation :

When you pull the hanging eraser to one side and release it, it does start moving to and fro. It swings back and forth repeatedly about its initial resting position (the lowest point).

Ans :

Yes, the motion of the swinging eraser is very similar to the motion of a child on a swing. Both exhibit a repeating back-and-forth movement around a central point. This setup (eraser on a thread) is a simple pendulum.

Activity 5.6 : Let us investigate

1. Take a thin metal strip of about 50 cm long.
2. Hold its one end pressed to a table. You may use a few books or a brick to hold it (Figure).

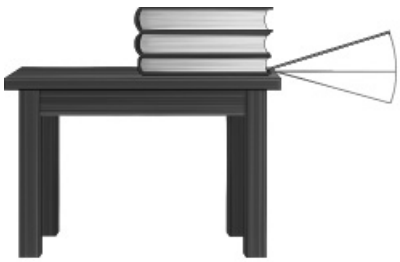

Figure : Oscillatory motion of a meta strip

3. Press the free end of the strip slightly and let it go.
4. Observe the motion of this end of the strip.

Does it move up and down? This is also an example of oscillatory motion.

Observation :

When you press the free end of the metal strip down and release it, you will observe that the end moves up and down rapidly, vibrating about its original horizontal position.

Ans :

Yes, the motion is up and down , this type of vibration (moving back and forth, or in this case, up and down, about a fixed equilibrium position) is indeed another example of oscillatory motion.

Activity 5.7 : Let us identify

1. Look at the picture of a children's park (Figure). Visit a children's park.

Figure : Types of motion observed in a children's park

2. Observe different kinds of motions. Classify them : linear, circular or oscillatory motion.

List them in Table. Give your justification for why you put each in a certain category.

Table : Types of Motion

Object	Linear motion	Circular motion	Oscillatory motion	Justification
Swing			Moving to and fro	

Ans :

This activity requires you to identify different types of motion (Linear, Circular, Oscillatory) by observing the activities shown in the children's park picture (Figure) or by visiting a real park. You need to fill Table based on your observations.

Object / Activity	Type of Motion	Justification
Child on Swing	Oscillatory	Moves back and forth (to and fro) about a fixed point.
Child on Slide	Linear	Moves along a straight path down the slide.

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Merry-go-round	Circular	Children/horses move along a circular path around the center.
Children on See-saw	Oscillatory	Move up and down (to and fro) around the central pivot.
Child Skipping (Body)	Oscillatory	Moves up and down repeatedly.
Skipping Rope (Itself)	Circular	Parts of the turning rope move in circles.
Child Waving on Frame	Oscillatory	Hand moves back and forth.

NCERT EXERCISE

1. Some lengths are given in Column I of Table. Some units are given in Column II. Match the lengths with the units suitable for measuring those lengths.

Column I	**Column II**
Distance between Delhi and Lucknow	centimetre
Thickness of a coin	kilometre
Length of an eraser	metre
Length of school ground	millimeter

Ans :

Column I	**Column II**
Distance between Delhi and Lucknow	kilometre
Thickness of a coin	millimeter
Length of an eraser	centimeter
Length of a school ground	metre

(i) Kilo metres (km) are used for long distances between cities.
(ii) Millimeters (mm) are suitable for measuring very small thicknesses.
(iii) Centimeters (cm) are convenient for small objects like erasers.
(iv) Metres (m) are appropriate for larger lengths like playgrounds or rooms.

2. Read the following statements and mark True (T) or False (F) against each.
(i) The motion of a car moving on a straight road is an example of linear motion. [ ]
(ii) Any object which is changing its position with respect to a reference point with time is said to be in motion. [ ]
(iii) 1 km = 100 cm [ ]

Ans :

(i) T (True). Linear motion is defined as motion along a straight line.
(ii) T (True). This is the definition of motion.
(iii) F (False). 1 kilometre (km) = 1000 metres (m), and 1 metre (m) = 100 centimetres (cm). Therefore, 1 km = 1000 100 cm = 100,000 cm.

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3. Which of the following is not a standard unit of measuring length?
(i) millimeter
(ii) centimeter
(iii) kilometre
(iv) hands pan

Ans :

(iv) hands pan
Millimeter, centimeter, and kilometre are standard units derived from the base SI unit of length, the metre. A hands pan is a non-standard unit because its length varies from person to person.

4. Search for the different scales or measuring tapes at your home and school. Find out the smallest value that can be measured using each of these scales. Record your observations in a tabular form.

Ans :

This question requires performing an activity. The smallest value that can be measured is called the least count of the instrument.

Procedure :

Look at the markings on different scales (like a 15 cm ruler, a 30 cm ruler, a metre scale, a measuring tape). Find the value represented by the smallest division marked on the scale.
Example: Observation Table:

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Measuring Instrument	Smallest Marked Division	Least Count (Smallest Value Measurable)
15 cm Plastic Ruler	1 millimetre (mm)	1 mm (0.1 cm)
Tailor's Measuring Tape	1 millimetre (mm)	1 mm (0.1 cm)
Metre Scale (Wood/ Metal)	1 millimetre (mm)	1 mm (0.1 cm)
Vernier Caliper	0.1 millimetre (mm)	0.1 mm (0.01 cm)
Micrometer Screw Gauge	0.01 millimetre (mm)	0.01 mm (0.001 cm)

5. Suppose the distance between your school and home is 1.5 km. Express it in metres.

Ans :

We know that

$$1 \text{ kilometre (km)} = 1000 \text{ metres (m)}.$$

$$\text{Distance} = 1.5 \text{ km}$$

$$\text{Distance in metres} = 1.5 \times 1000 \text{ m}$$

$$\text{Distance in metres} = 1500 \text{ m}$$

6. Take a tumbler or a bottle. Measure the length of the curved part of the base of glass or bottle and record it.

Ans :

This requires performing an activity. To measure the curved length (circumference) of the base:

1. Take a piece of thread or flexible measuring tape.
2. Carefully wrap the thread exactly once around the curved base of the tumbler/bottle.
3. Mark the point on the thread where it completes the circle.
4. Straighten the thread and place it along a metre scale.
5. Measure the length of the thread from its starting end up to the mark. This length is the length of the curved part (circumference).

7. Measure the height of your friend and express it in (i) metres, (ii) centimeters and (iii) millimeters.

Ans :

Let's assume you measure your friend's height and find it to be 145 centimeters.

1. Metres : Since 1 metre (m) = 100 centimeters (cm), Height in metres = 145 ÷ 100 =1.45 m.
2. Centimeters : Height in centimeters = 145 cm (as measured).
3. Millimeters : Since 1 centimeter (cm) = 10 millimeters (mm), Height in millimeters = 145×10=1450 mm. (You should replace 145 cm with the actual measurement you take).

8. You are given a coin. Estimate how many coins are required to be placed one after the other lengthwise, without leaving any gap between them, to cover the whole length of the chosen side of a notebook. Verify your estimate by measuring the same side of the notebook and the size of the coin using a 15-cm scale.

Ans :

This involves estimation and measurement.

1. Estimation : Look at the coin and the edge of the notebook. Guess how many coins would fit side-by-side along the edge. Record your estimate (e.g., I estimate 12 coins).
2. Verification by Placing : Place the coins physically along the edge without gaps and count how many fit. Record the actual count (e.g., Actually, 14 coins fit).
3. Verification by Measurement:
   (i) Measure the length of the chosen notebook side using the scale (e.g., Length = 21 cm).
   (ii) Measure the diameter (size) of one coin using the scale (e.g., Diameter = 1.5 cm).
   (iii) Calculate the number of coins : Number = (Length of notebook side) / (Diameter of coin) = 21 ÷ 1.5 = 14.

4 Compare : Compare your estimate, the actual count, and the calculated number. Discuss any differences.

9. Give two examples each for linear, circular and oscillatory motion.

Ans :

1. Linear motion:
   (i) A car moving on a straight road.
   (ii) An apple falling from a tree. (Other examples : Athlete running on a straight track, train on a straight track)
2. Circular motion:
   (i) The motion of the tip of the hands of a clock.

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(ii) The motion of a point on the blade of a spinning fan. (Other examples : Merry-go-round, stone whirled on a string)

3. Oscillatory motion:
   (i) The motion of a child on a swing.
   (ii) The motion of the pendulum of a clock. (Other examples : A plucked guitar string, the needle of a sewing machine)

10. Observe different objects around you. It is easier to express the lengths of some objects in mm, some in cm and some in m. Make a list of three objects in each category and enter them in the Table.

Table : Sizes of objects around us

Size	Objects
mm	
cm	
m	

Ans :

This requires observation. Here's an example completion:

Size	Objects
mm	Thickness of a coin, Pencil lead diameter, Ant's length
cm	Length of a pencil, Width of a book, Length of a mobile phone
m	Length of a room, Height of a door, Length of a blackboard

11. A roller coaster track is made in the shape shown in figure. A ball starts from point A and escapes through point F. Identify the types of motion of the ball on the roller coaster and corresponding portions of the track.

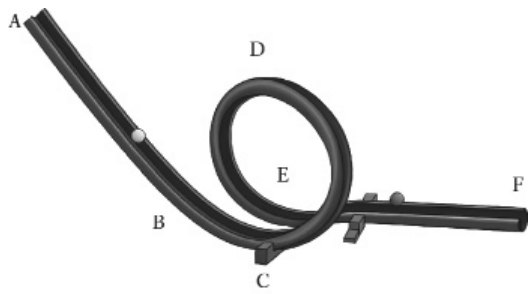

Figure : Rollercoaster track

Ans :

1. Portion A to B : The ball moves down a slope, mostly straight. This is primarily Linear motion (or motion along a straight line).
2. Portion B to C : The ball moves along an upward curve. This is Curvilinear motion (motion along a curved path).
3. Portion C to D to E : The ball moves through a loop. This is Circular motion (or curvilinear motion along a circular path).
4. Portion E to F : The ball moves along a straight horizontal path. This is Linear motion.

12. Tasman wants to make a metre scale by herself. She considers the following materials for it plywood, paper, cloth, stretchable rubber and steel. Which of these should she not use and why?

Ans :

Tasman should not use paper, cloth and stretchable rubber.

Why:

1. Paper : Paper is not durable, can tear easily, and its dimensions can change if it gets wet or due to humidity. It is not rigid enough for a reliable scale.
2. Cloth : Cloth is flexible and can easily stretch or shrink, meaning its length is not constant. This would lead to inaccurate measurements.
3. Stretchable rubber : Rubber is designed to stretch significantly. Its length changes easily under tension, making it completely unsuitable for creating a measuring scale which must have a fixed and constant length.
4. Suitable materials : Plywood and steel are generally rigid and maintain their shape and length under normal conditions, making them more suitable (though steel might be harder to mark accurately at home).

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MULTIPLE CHOICE QUESTION

1. What is a unit in the context of measurement, as exemplified by using hands pans to measure a table?

(A) The number representing the measured quantity.
(B) The tool used for taking the measurement.
(C) A fixed quantity used as a standard for comparison in measurement.
(D) The process of comparing an unknown quantity.

Ans :

(C) A fixed quantity used as a standard for comparison in measurement.
A unit is a chosen standard quantity against which other similar quantities are compared. For example, if a table's length is 13 handspans, 'handspan' is the unit used for comparison.

2. What was Deepa's mother's instruction to the tailor regarding the length of the new uniform?
(A) To decrease the length by two fingers width.
(B) To increase the length by char angula (four fingers width).
(C) To keep the length the same as the old uniform.
(D) To measure the length using a metal rod only.

Ans :

(B) To increase the length by char angula (four fingers width).
Deepa's mother asked the tailor to lengthen her new uniform by char angula, meaning four fingers' width—an example of a traditional unit of measurement.

3. Why did Deepa and her friends get different measurements for the length of the same table when using their hands pans?
(A) The table's length was changing.
(B) Some students did not know how to count properly.
(C) Their hands pans were of different sizes.
(D) They used different parts of their hands.

Ans :

(C) Their hands pans were of different sizes.
Using body parts like hands pans for measurement leads to varied results because the size of these body parts differs from person to person. This inconsistency highlights the need for standard units.

4. What is the SI unit of length?
(A) Centimetre
(B) Kilometre
(C) Metre
(D) Millimetre

Ans :

(C) Metre
The SI (International System of Units) standard unit for measuring length is the metre, represented by the symbol 'm', and it helps maintain consistency in measurements across the world.

5. How many centimeters are there in one metre?
(A) 10 centimeters
(B) 100 centimeters
(C) 1000 centimeters
(D) 50 centimeters

Ans :

(B) 100 centimeters
A metre is divided into 100 equal divisions, and each of these divisions is called a centimetre. Therefore, 1 metre is equivalent to 100 centimeters.

6. Why is it generally inconvenient to use the unit metre to measure very large distances, like between cities, or very small lengths, like the thickness of a page?
(A) Metre scales are not accurate for any distance.
(B) The numbers involved become too large or too small, making them unwieldy.
(C) Metres can only be used for measuring cloth.
(D) The SI system does not allow using metres for such lengths.

Ans :

(B) The numbers involved become too large or too small, making them unwieldy.
For very large distances, expressing them in metres results in very large numbers, while for very small lengths, it results in very small decimal numbers. Larger units (like kilo metres) or smaller units (like millimetres) are more practical.

7. What is the smallest value of length that can typically be measured using a standard 15-cm classroom scale?
(A) 1 centimetre
(B) 0.5 centimetre
(C) 1 millimetre
(D) 0.1 millimetre

Ans :

(C) 1 millimeter
A standard 15-cm scale has each centimeter divided into 10 equal parts, where each part represents 1 millimetre. This is the smallest division, hence the smallest value accurately measurable.

8. How many millimetres are there in one centimetre?
(A) 100 millimetres
(B) 5 millimeters
(C) 10 millimeters
(D) 20 millimeters

Ans :

(C) 10 millimetres

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Each centimetre on a measuring scale is divided into 10 equal smaller parts, and the length of one such smaller part is a millimetre. Thus, 1 cm equals 10 mm.

9. What is the main advantage of using standard units of measurement (like SI units) over traditional units (like hands pan or Angola)?
(A) Standard units are easier to remember.
(B) Traditional units are more accurate for small lengths.
(C) Standard units ensure consistency and avoid differences in measurements made by different people.
(D) Traditional units do not require any measuring tools.

Ans :

(C) Standard units ensure consistency and avoid differences in measurements made by different people.
Traditional units based on body parts vary from person to person, leading to inconsistent measurements. Standard units provide a common, unchanging reference, ensuring uniformity and reliability in measurements globally.

10. If a tailor needs to measure the girth of a tree or the size of a person's chest, which measuring tool would be most suitable?
(A) A rigid metre scale.
(B) A 15-cm plastic ruler.
(C) A flexible measuring tape.
(D) Counting strides or foot lengths.

Ans :

(C) A flexible measuring tape.
For measuring curved surfaces or circumferences like the girth of a tree or a person's chest, a rigid scale is unsuitable. A flexible measuring tape can conform to the curve, providing an accurate measurement.

11. What is the correct way to place a scale when measuring the length of an object?
(A) Slightly above the object without touching it.
(B) At an angle to the object's length.
(C) In contact with the object, along its length.
(D) With the zero mark always at the right end of the object.

Ans :

(C) In contact with the object, along its length.
To measure accurately, the scale should be placed directly in contact with the object being measured, and aligned parallel to the length that is to be measured.

12. A student is measuring the length of a pencil using a scale whose zero mark is broken. The student aligns one end of the pencil with the 2.0 cm mark, and the other end aligns with the 11.5 cm mark. What is the actual length of the pencil?
(A) 11.5 cm
(B) 13.5 cm
(C) 9.5 cm
(D) 2.0 cm

Ans :

(C) 9.5 cm
When the zero mark is unusable, one end of the object is aligned with another clear mark on the scale. The length is then found by subtracting this starting mark's reading from the reading at the other end: $11.5\text{cm} - 2.0\text{cm} = 9.5\text{cm}$.

13. How do visually challenged students typically measure lengths?
(A) By estimating the length based on sight.
(B) Using scales with raised markings that can be felt by touch.
(C) By having someone else measure for them.
(D) Using specialized sound-based measuring devices.

Ans :

(B) Using scales with raised markings that can be felt by touch.
Visually challenged individuals use specially designed scales with raised, tactile markings that allow them to feel and understand measurements through touch..

14. What is a reference point in the context of describing an object's position or motion?
(A) Any point chosen randomly in space.
(B) The object whose position is being described.
(C) A fixed object or point with respect to which position or motion is stated.
(D) The unit used to measure the distance.

Ans :

(C) A fixed object or point with respect to which position or motion is stated.
A reference point is a stationary location or object used for comparison to determine if something is moving or to describe its position accurately.

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15. Why did Deepa and her friends initially have different ideas about whether the garden or the school was closer?
(A) Because the garden and school kept changing their locations.
(B) Because they were each considering the distance from their own houses (different reference points).
(C) Because some of them were not good at judging distances.
(D) Because they were using different units of measurement.

Ans :

(B) Because they were each considering the distance from their own houses (different reference points).
Their perceptions of closer or farther differed because each was using their own house as the reference point. If they had used a common reference point, their observations of relative distances would have been consistent.

16. Padma is on a bus trip to Delhi. She sees a kilometre stone that reads Delhi 70 km. Later, she sees one that reads Delhi 60 km. What is the reference point for these distances?
(A) Padma's starting point.
(B) The bus she is travelling in.
(C) The city of Delhi.
(D) The previous kilometre stone.

Ans :

(C) The city of Delhi.
The kilometre stones indicate the remaining distance to Delhi. Therefore, Delhi is the fixed reference point against which Padma's changing position (and distance) is being measured.

17. When is an object said to be in motion?
(A) When it is very heavy.
(B) When its position changes with respect to a reference point with time.
(C) When it changes its shape or size.
(D) When it is making a sound.

Ans :

(B) When its position changes with respect to a reference point with time.
Motion is defined as the change in an object's position over time relative to a fixed reference point. If there's no change in position relative to the reference point, the object is at rest.

18. If Deepa is on a moving bus and considers herself as the reference point, are the other seated passengers in motion or at rest relative to her?
(A) They are in motion because the bus is moving.
(B) They are at rest because their position is not changing relative to Deepa.
(C) Some are in motion and some are at rest.
(D) It's impossible to tell without looking outside.

Ans :

(B) They are at rest because their position is not changing relative to Deepa.
Motion is relative. If Deepa (also on the bus) is the reference point, and the other passengers maintain their seated positions, their position relative to Deepa does not change with time, so they are at rest with respect to her.

19. What type of motion is described when an object moves along a straight line?
(A) Circular motion
(B) Oscillatory motion
(C) Linear motion
(D) Random motion

Ans :

(C) Linear motion
Linear motion, also known as rectilinear motion, is characterized by an object moving along a straight path or line. Examples include a car moving on a straight road or a dropped object falling vertically.

20. What type of motion does a merry-go-round exhibit?
(A) Linear motion
(B) Circular motion
(C) Oscillatory motion
(D) Translational motion

Ans :

(B) Circular motion
A merry-go-round involves objects or people moving in a circular path around a central axis. This type of movement is defined as circular motion.

21. What is oscillatory motion?
(A) Motion in a perfect circle at a constant speed.
(B) Motion along a straight line without changing direction.
(C) Motion where an object moves to and fro about some fixed position.
(D) Motion that covers equal distances in equal intervals of time.

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Ans :

(C) Motion where an object moves to and fro about some fixed position.
Oscillatory motion is a repetitive back-and-forth movement of an object around a central or equilibrium position. A swinging pendulum is a classic example.

22. A child on a swing moves back and forth. What type of motion is this?
(A) Linear motion only
(B) Circular motion only
(C) Oscillatory motion
(D) Random motion

Ans :

(C) Oscillatory motion
The movement of a child on a swing is a repetitive to-and-fro motion about a central, lowest point. This is a characteristic example of oscillatory motion.

23. What does it mean if an object's motion is periodic?
(A) It moves only in a straight line.
(B) It moves very slowly.
(C) It repeats its path after a fixed interval of time.
(D) It covers a very long distance.

Ans :

(C) It repeats its path after a fixed interval of time.
Periodic motion is any motion that repeats itself in equal intervals of time. Both circular motion (like a planet orbiting) and oscillatory motion (like a pendulum) can be periodic.

24. Which of the following is NOT an example of a unit of length mentioned in ancient Indian literature?
(A) Angula (finger width)
(B) Yojana
(C) Dhanusa
(D) Fathom

Ans :

(D) Fathom
Ancient Indian texts refer to units of length such as angula, dhanusa, and yojana, while the fathom is a unit of length from another historical system, commonly used to measure water depth.

25. **Assertion (A) :** Measurements made using hands pans can vary from person to person.
Reason (R) : The size of a person's hands pan is not a universally fixed standard.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Hands pans differ in size among individuals. Because there's no standard size for a hands pan, using it as a unit of measurement will inevitably lead to different numerical results for the same length when measured by different people.

26. Which of the following statements about measuring length are correct?
1. The SI unit of length is the metre.
2. To measure a curved line, a straight rigid scale is always the best tool.
3. When reading a scale, your eye should be directly above the mark.

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(C) 1 and 3 only
The SI unit of length is indeed the metre. For accurate reading, the eye position should be directly above the mark to avoid parallax error. A flexible tape or thread is better for curved lines than a rigid scale.

27. A carpenter is building a bookshelf. To ensure the shelves are of the correct width, she uses a metal rod with markings on it. This metal rod is an example of a:
(A) Traditional unit of measurement.
(B) Tool for measuring volume.
(C) Measuring scale using standard units.
(D) Device for measuring motion.

Ans :

(C) Measuring scale using standard units.
A metal rod with centimeter and millimeter markings is a measuring scale that uses standard SI units (or their subdivisions) for length, ensuring accuracy and consistency in the carpenter's work.

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28. What is the name of the system of units that is now used internationally for standard measurements?
(A) The Imperial System
(B) The Metric System (specifically SI)
(C) The Traditional Indian System
(D) The Angula System

Ans :

(B) The Metric System (specifically SI)
The currently used system of measurement is called the 'International System of Units' or SI units, which is the modern version of the metric system.

29. If you are measuring the length of a piece of cloth and the end of your metre scale is broken (the '0' mark is missing), what should you do to get an accurate measurement?
(A) Estimate the missing part and add it to the reading.
(B) Start measuring from any full mark (e.g., 1 cm or 10 cm) and subtract that starting value from the final reading.
(C) Use the broken end as if it were zero.
(D) The scale cannot be used accurately anymore.

Ans :

(B) Start measuring from any full mark (e.g., 1 cm or 10 cm) and subtract that starting value from the final reading.
If the zero mark is damaged, an accurate measurement can still be obtained by aligning one end of the object with another clear, full mark on the scale and then subtracting that mark's value from the reading at the object's other end.

30. When an object moves along a circular path, its motion is called:
(A) Linear motion
(B) Oscillatory motion
(C) Rotational motion (or Circular motion)
(D) Zigzag motion

Ans :

(C) Rotational motion (or Circular motion)
Motion that follows a circular path is known as circular motion, while rotational motion refers to an object spinning around its own axis—both are closely related types of movement..

31. The traditional Indian unit of length angula refers to:
(A) The length of an arm.
(B) The width of a foot.
(C) The width of a finger.
(D) The length of a stride.

Ans :

(C) The width of a finger.
Angula (finger width) was one of the units used in ancient Indian measurement systems.

32. How does linear motion differ from circular motion?
(A) Linear motion is always fast; circular motion is always slow.
(B) Linear motion is along a straight line; circular motion is along a curved, circular path.
(C) Linear motion involves repetition; circular motion does not.
(D) Linear motion requires a reference point; circular motion does not.

Ans :

(B) Linear motion is along a straight line; circular motion is along a curved, circular path.
The defining characteristic of linear motion is movement in a straight line. In contrast, circular motion involves an object moving along the circumference of a circle or a circular arc.

33. Which of these is NOT a type of motion explicitly discussed with examples in section 5.7 Types of Motion?
(A) Linear motion
(B) Circular motion
(C) Oscillatory motion
(D) Vibrational motion

Ans :

(D) Vibrational motion
Section 5.7 focuses on illustrating linear, circular, and oscillatory motions with activities and examples. While vibrational motion is related to oscillatory, it is not explicitly detailed as a distinct category in this section.

34. The hands of a clock moving around the dial primarily exhibit which type of motion?
(A) Linear motion
(B) Circular motion
(C) Oscillatory motion
(D) Random motion

Ans :

(B) Circular motion
The tips of the hands of a clock trace circular paths as they move around the center of the clock face. This is a clear example of circular motion.

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35. **Assertion (A) :** An object can be at rest with respect to one reference point and in motion with respect to another.
Reason (R) : Motion is a relative concept and depends on the chosen reference point.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
The state of rest or motion of an object is not absolute but depends on the frame of reference. For instance, a passenger on a bus is at rest relative to the bus but in motion relative to the ground.

36. Which of the following are examples of oscillatory motion?
1. A car moving on a straight highway.
2. A child on a swing.
3. A plucked guitar string.

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(B) 2 and 3 only
A child on a swing and a plucked guitar string both exhibit to-and-fro movement about a central position, which is characteristic of oscillatory motion. A car on a straight highway undergoes linear motion.

37. A teacher asks students to measure the length of their classroom using a 15-cm scale. Why would this be an inefficient method?
(A) A 15-cm scale cannot measure lengths greater than 15 cm at all.
(B) It would require repeated measurements, increasing chances of error and taking a lot of time.
(C) Centimetres are not standard units for classroom length.
(D) The scale is too flexible for measuring a room.

Ans :

(B) It would require repeated measurements, increasing chances of error and taking a lot of time.
Using a very small measuring tool (15-cm scale) for a relatively large length (8 metres) necessitates laying the scale multiple times. This process is tedious, time-consuming and accumulates errors with each repositioning. A longer tape measure would be more appropriate.

38. How much is 1 inch approximately equal to in centimetres ?
(A) 1.54 cm
(B) 2.00 cm
(C) 2.54 cm
(D) 3.00 cm

Ans :

(C) 2.54 cm
The conversion factor given is that 1 inch equals 2.54 centimeters, a unit still used in certain situations today.

39. If an object is in circular motion and its motion is also periodic, what does this imply?
(A) It moves in a circle only once.
(B) It completes each circular path in a fixed interval of time.
(C) It changes its speed constantly while moving in a circle.
(D) It moves along a straight line after completing the circle.

Ans :

(B) It completes each circular path in a fixed interval of time.
Periodic motion means the motion repeats itself after a fixed time interval. If circular motion is periodic, it means the object repeatedly traverses the circular path, taking the same amount of time for each revolution.

40. The movement of a piston in an engine up and down is an example of which type of motion?
(A) Circular motion
(B) Primarily linear motion (reciprocating) which can also be seen as oscillatory over its path
(C) Random motion
(D) Non-periodic motion

Ans :

(B) Primarily linear motion (reciprocating) which can also be seen as oscillatory over its path
The piston moves back and forth in a straight line within the cylinder. This to-and-fro linear movement is a form of reciprocating motion, which is a type of oscillatory motion.

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MATCHING TYPE QUESTION

41. Match the method of measurement in Column A with the object or situation it is suitable for in Column B:

	Column A		Column B
1.	Handspan	A.	Measuring the length of a pencil
2.	15-cm Scale	B.	Measuring the girth of a tree
3.	Flexible Measuring Tape	C.	Measuring the length of a curved line
4.	Thread and Scale	D.	Non-standard unit, varies from person to person

(a) 1-D, 2-A, 3-B, 4-C
(b) 1-A, 2-D, 3-C, 4-B
(c) 1-D, 2-C, 3-A, 4-B
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(a) 1-D, 2-A, 3-B, 4-C
Hands pan is a non-standard unit. A 15 cm scale is for small straight objects like pencils. Flexible tape measures curved surfaces like tree girth. Thread and scale can measure curved lines.

42. Match the type of motion in Column A with its correct description or example in Column B:

	Column A		Column B
1.	Linear Motion	A.	Motion repeating its path after a fixed time interval
2.	Circular Motion	B.	To-and-fro movement about a fixed position (e.g., a swing)
3.	Oscillatory Motion	C.	Movement along a straight line (e.g., a car on a straight road)
4.	Periodic Motion	D.	Movement along a circular path (e.g., a merry-go-round)

(a) 1-B, 2-D, 3-A, 4-C
(b) 1-C, 2-A, 3-B, 4-D
(c) 1-C, 2-D, 3-B, 4-A
(d) 1-D, 2-C, 3-A, 4-B

Ans :

(c) 1-C, 2-D, 3-B, 4-A
Linear motion is along a straight line. Circular motion is along a circle. Oscillatory motion is to-and-fro. Periodic motion repeats at fixed time intervals; circular and oscillatory motions are examples.

43. Match the concept related to describing position or motion in Column A with its definition in Column B:

	Column A		Column B
1.	Unit	A.	A fixed object or point used to describe location or motion
2.	Reference Point	B.	When an object's position changes with time relative to a reference
3.	Motion	C.	The state of an object when its position doesn't change with time
4.	Rest	D.	A standard quantity used for measurement (e.g., handspan, metre)

(a) 1-D, 2-A, 3-B, 4-C
(b) 1-A, 2-D, 3-C, 4-B
(c) 1-D, 2-C, 3-A, 4-B
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(a) 1-D, 2-A, 3-B, 4-C
A unit is a standard for measurement. A reference point is used to define position. Motion is a change in position over time. Rest is no change in position.

44. Match the precaution or correct method in measurement (Column A) with the measurement task it relates to (Column B):

	Column A		Column B
1.	Eye directly above the mark	A.	When using a scale with a damaged zero end
2.	Place scale in contact along length	B.	General rule for writing measurements

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3.	Subtract initial reading from final	C.	For accurate reading of a scale
4.	Leave space between number and unit symbol	D.	For correctly aligning a scale with an object

(a) 1-A, 2-D, 3-C, 4-B
(b) 1-C, 2-B, 3-D, 4-A
(c) 1-D, 2-C, 3-A, 4-B
(d) 1-C, 2-D, 3-A, 4-B

Ans :

(d) 1-C, 2-D, 3-A, 4-B
Correct eye position prevents parallax errors. The scale must be aligned along the object's length. Subtraction is needed for broken scales. Correct formatting is important for recording measurements.

VERY SHORT QUESTION

45. What did Deepa's mother ask the shopkeeper for to make a new uniform?

Ans :

Deepa's mother asked for a two-metre cloth piece.

46. Name one body part that was traditionally used for measuring length, as mentioned by Deepa's friends.

Ans :

Handspan (or arm, foot, strides).

47. What is the term for a quantity like hands pan when used for measurement?

Ans :

Hands pan, when used for measurement, is an example of a unit.

48. Why do measurements of the same length differ when using body parts like hands pans?

Ans :

Measurements differ because body parts like hands pans are of different sizes for different people.

49. Name one ancient Indian unit of length mentioned.

Ans :

Angula (or dhanusa, yojana).

50. What is the full form of SI units?

Ans :

SI units stands for the International System of Units.

51. What is the SI unit of length?

Ans :

The SI unit of length is metre.

52. How many centimetres are there in one metre?

Ans :

There are 100 centimeters in one metre.

53. How many millimeters are there in one centimeter?

Ans :

There are 10 millimeters in one centimeter.

54. What larger unit of length is commonly used for measuring the distance between two cities?

Ans :

Kilometre (km) is used for measuring larger distances.

55. What type of measuring device is suitable for measuring the girth of a tree?

Ans :

A flexible measuring tape is suitable for measuring the girth of a tree.

56. How should your eye be positioned when reading a measurement on a scale to avoid errors?

Ans :

Your eye should be positioned directly above the mark being read on the scale.

57. If a scale has a broken zero end, can it still be used for measurement?

Ans :

Yes, it can be used by starting from another full mark and subtracting that reading.

58. How can the length of a curved line be measured using a thread?

Ans :

Place the thread along the curved line, then straighten the thread and measure its length with a scale.

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59. What is a fixed object or point called with respect to which distance is stated?

Ans :

It is called a reference point.

60. When is an object said to be in motion?

Ans :

An object is said to be in motion if its position changes with respect to a reference point with time.

61. What type of motion does an object exhibit when it moves along a straight line?

Ans :

It exhibits linear motion.

62. What type of motion is the movement of an object along a circular path called?

Ans :

It is called circular motion.

63. When an object moves to and fro about a fixed position, what is its motion called?

Ans :

Its motion is called oscillatory motion.

64. What is motion called if an object repeats its path after a fixed interval of time?

Ans :

Such motion is called periodic motion.

SHORT ANSWER QUESTION

65. Why was there a need to develop standard units of measurement?

Ans :

Non-standard units like hands pans differ from person to person, leading to inconsistent measurements. Standard units ensure uniformity and avoid confusion in trade and communication.

66. What are the two parts that express a measurement of length? Give an example.

Ans :

A measurement of length is expressed by a number and a unit. For example, if a table is 2 metres long, '2' is the number and 'metre' is the unit.

67. Mention two ancient Indian units of measurement and state where evidence of scales has been found.

Ans :

Two ancient Indian units are 'angula' (finger width) and 'yojana'. Evidence of scales has been excavated from sites of the Harappan Civilization.

68. Explain the relationship between metre, centimetre, and millimetre.

Ans :

One metre (m) equals 100 centimeters (cm). One centimetre (cm) equals 10 millimetres (mm). These are standard SI units for measuring length.

69. What unit of length would be appropriate to measure the thickness of a coin? Why?

Ans :

Millimetre (mm) would be appropriate to measure the thickness of a coin because a coin is very thin, and millimetre is a small unit for precise measurement.

70. Describe the correct way to place a scale when measuring the length of an object like a pencil.

Ans :

The scale should be placed in contact with the object, along its length, ensuring one end of the object aligns with a clear mark on the scale.

71. If a scale's zero mark is unclear, how can you accurately measure an object's length starting from the 2 cm mark?

Ans :

Align one end of the object with the 2.0 cm mark. Read the mark at the other end. Subtract 2.0 cm from this reading to get the object's length.

72. How do visually challenged students measure lengths using a scale?

Ans :

Visually challenged students use scales with raised markings. They can feel these markings by touching them to determine the length.

73. State two rules for writing units of length like metre or centimetre and their symbols.

Ans :

Symbols (m, cm) are written in lowercase and are not followed by 's' for plural. A space is left between the number and the unit symbol.

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74. Why is a flexible measuring tape more suitable than a rigid metre scale for measuring a person's chest?

Ans :

A flexible measuring tape can easily wrap around the curved surface of a person's chest, providing an accurate measurement, which a rigid scale cannot do.

75. What is a reference point? Why is it important when describing the position of an object?

Ans :

A reference point is a fixed object or location used for comparison. It is important because it provides a basis from which an object's position or motion can be clearly described.

76. How do kilometre stones on a highway help a traveller determine if they are getting closer to their destination?

Ans :

Kilometre stones indicate the remaining distance to a destination (reference point). Decreasing numbers on successive stones mean the traveller is getting closer.

77. When is an object considered to be at rest? Give an example.

Ans :

An object is at rest if its position does not change with time with respect to a chosen reference point. For example, a book lying on a table.

78. Can an object be in motion and at rest at the same time? Explain with an example.

Ans :

Yes, relative to different reference points. For example, passengers in a moving bus are at rest relative to the bus but in motion relative to a tree outside.

79. Give two examples of objects exhibiting linear motion from your daily life.

Ans :

A car moving on a straight road and an apple falling from a tree are examples of objects exhibiting linear motion in daily life.

80. Give two examples of objects exhibiting circular motion.

Ans :

The blades of a spinning fan and a stone whirled at the end of a string are examples of objects exhibiting circular motion.

81. Give two examples of objects exhibiting oscillatory motion.

Ans :

The motion of a child on a swing and the to-and-fro movement of a pendulum in a clock are examples of oscillatory motion.

82. How is periodic motion defined? Are circular and oscillatory motions periodic?

Ans :

Periodic motion is when an object repeats its path after a fixed interval of time. Yes, both circular and oscillatory motions are typically periodic in nature.

83. A soldier marching in a parade exhibits what type of motion? Justify your answer.

Ans :

A soldier marching in a parade on a straight path exhibits linear motion because their movement is along a straight line from one point to another.

84. The hands of a clock exhibit which type of motion?

Ans :

The hands of a clock primarily exhibit circular motion as they move along a circular path around the center of the clock face. They also exhibit periodic motion.

LONG ANSWER QUESTION

85. Describe some non-standard units of measurement used in ancient times or even today for rough estimations. Why did these methods lead to the need for standard units like the metre?

Ans :

Anciently, body parts like hands pan, cubit (arm length), foot length, and strides were used. These are non-standard because their sizes vary from person to person. This variation caused confusion and inconsistency, especially in trade, necessitating the development of fixed, standard

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units like the metre for reliable and uniform measurements.

86. Explain the SI system of units. What is the SI unit of length, and how is it subdivided into smaller units like centimeter and millimeter for convenience?

Ans :

The International System of Units (SI) is a globally adopted standard system for measurements. The SI unit of length is the metre (m). For convenience in measuring smaller lengths, one metre is divided into 100 equal parts called centimeters (cm), and one centimeter is further divided into 10 equal parts called millimeters (mm).

87. List three important precautions one must take while measuring length using a standard scale to ensure accuracy. Explain why each precaution is necessary.

Ans :

1. Place the scale correctly along the length of the object to avoid misreading.
2. Position your eye directly above the scale marking being read to prevent parallax error, which can make the reading seem shifted.
3. If the zero end is broken, start from another clear full mark and subtract this value from the final reading.

88. How can you measure the length of a curved path, for example, the boundary of an irregularly shaped garden pond? Describe the method in steps.

Ans :

To measure a curved path, one can use a thread. First, carefully lay the thread along the entire curved boundary of the pond, ensuring it follows the curves accurately. Mark the start and end points on the thread. Then, straighten the thread and measure its length between the marked points using a standard metre scale or measuring tape.

89. Explain the concept of a 'reference point' in describing motion. Give an example to show how the choice of a reference point can change the description of an object's state of motion.

Ans :

A reference point is a fixed location or object used to determine if another object's position has changed. For instance, a person sitting in a moving train is at rest with respect to the train (reference point: train interior) but is in motion with respect to the tracks or trees outside (reference point: ground).

90. Define linear, circular, and oscillatory motion. Provide one clear real-world example for each type, explaining why it fits the definition.

Ans :

Linear motion is movement along a straight line (e.g., a ball rolling straight on the floor). Circular motion is movement along a circular path (e.g., a point on a spinning top's edge). Oscillatory motion is repetitive to-and-fro movement about a fixed position (e.g., a child on a swing).

91. Imagine you are in a moving train with no windows, moving smoothly on a straight track. Can you tell if the train is moving or stationary without looking outside? Explain your reasoning. (Evaluating)

Ans :

If the train moves very smoothly at a constant speed on a straight track, it would be difficult to tell if it's moving or stationary without an external reference point. This is because your body and objects inside would move with the train, feeling no change in motion relative to the train's interior.

92. Describe the correct procedure for reading a measurement from a scale, including the placement of the scale and the position of the eye. Why are these steps important?

Ans :

Place the scale in contact with the object, along its length, with the zero mark (or another full mark if zero is broken) aligned with one end. The eye should be directly above the point on the scale being read. These steps are crucial to avoid errors like parallax, ensuring the measurement is accurate.

93. How are kilometre, metre, centimetre, and millimetre related to each other? Give an example of a length that would be best measured in each of these units.

Ans :

1 km = 1000 m; 1 m = 100 cm; 1 cm = 10 mm. Distance between cities is best in km. Height of a door in metres. Length of a pencil in centimeters. Thickness of a wire in millimeters. Choosing

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appropriate units makes measurements practical and numbers manageable.

94. What is periodic motion? Explain how both circular motion and oscillatory motion can be considered types of periodic motion, using examples.

Ans :

Periodic motion is any motion that repeats itself over a fixed interval of time. Circular motion, like the Earth revolving around the Sun, is periodic as it completes an orbit in a fixed time. Oscillatory motion, like a pendulum swinging, is also periodic as it repeats its to-and-fro movement regularly.

CASE BASED QUESTION

95. A tailor is stitching a dress. He first measures the customer's height using a measuring tape. Then, he measures the length of cloth required from a roll using a metal rod (metre scale). He needs to cut a curved neckline.

(i) Which measuring device is more appropriate for measuring the customer's chest circumference, and why?

(ii) Why does the tailor use a rigid metal rod to measure cloth from a roll?

(iii) How might the tailor measure the length of the curved neckline on the pattern paper?

Ans :

(i) A flexible measuring tape is more appropriate for measuring the chest circumference because it can easily conform to the curved shape of the body.

(ii) The tailor uses a rigid metal rod (metre scale) to ensure the cloth is measured straight and accurately, without any stretching that a flexible tape might allow.

(iii) The tailor might use a flexible measuring tape or a piece of thread, carefully laying it along the curved neckline on the pattern, and then measuring the thread's length.

96. A group of friends decided to measure the length of their classroom using their hands pans. Anil measured it as 20 hands pans, Sunita as 22 hands pans, and Ravi as 19 hands pans. They were confused by the different results.

(i) Why did the friends get different measurements for the same classroom length?

(ii) What type of unit is a 'hands pan' in this context?

(iii) What should they use to get a consistent and accurate measurement of the classroom length?

Ans :

(i) They got different measurements because each person's hands pan (the unit of measurement used) is of a different size.

(ii) 'Hands pan' is a non-standard unit of measurement.

(iii) They should use a standard measuring tool like a metre scale or a measuring tape to get a consistent and accurate measurement.

97. An athlete is running on a 400 m circular track. She completes one lap. During her run, her coach observes her from a fixed point on the side of the track.

(i) What is the distance covered by the athlete in one lap?

(ii) What type of motion is the athlete primarily exhibiting while running on the track?

(iii) Is the athlete in motion with respect to her coach? Explain.

Ans :

(i) The distance covered by the athlete in one lap is 400 m.

(ii) The athlete is primarily exhibiting circular motion as she runs along the circular track. It is also periodic if she maintains pace.

(iii) Yes, the athlete is in motion with respect to her coach because her position continuously changes relative to the coach (the reference point) as she runs.

98. A child is playing on a swing in a park. The swing moves back and forth. Another child is sliding down a straight slide. A merry-go-round is also in motion nearby.

(i) What type of motion does the child on the swing exhibit?

(ii) What type of motion does the child sliding down the straight slide exhibit?

(iii) If the merry-go-round is moving at a constant speed, its motion is circular. What other type of motion can it be classified as?

Ans :

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(i) The child on the swing exhibits oscillatory motion.
(ii) The child sliding down the straight slide exhibits linear motion.
(iii) If the merry-go-round moves at a constant speed, its motion can also be classified as periodic motion because it repeats its path.

99. To measure the length of a pencil, a student places it against a ruler. The tip of the pencil aligns with the 15 cm mark, and the eraser end aligns with the 3.5 cm mark. The ruler's zero end is broken.
(i) What is the length of the pencil? Show your calculation.
(ii) What precaution regarding eye position must the student take while reading these marks?
(iii) If the student had mistakenly read the eraser end as 3 cm instead of 3.5 cm, what would be the error in the calculated length?

Ans :

(i) The length of the pencil is 15 cm-3.5 cm = 11.5 cm.
(ii) The student must position their eye directly above the 15 cm mark and the 3.5 cm mark to avoid parallax error and ensure accurate readings.
(iii) The calculated length would be

$$15 \text{ cm} - 3 \text{ cm} = 12 \text{ cm}.$$

The error would be

$$12 \text{ cm} - 11.5 \text{ cm} = 0.5 \text{ cm (overestimated)}.$$

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CHAPTER 6

MATERIALS AROUND US

SUMMARY

1. OBSERVING OBJECTS AROUND US

1.1 Introduction

The chapter begins by observing everyday objects (like notebooks, pens) and noting that different objects are made of different materials (paper, wood, cloth, glass, metal, plastic, clay, etc.).

1.2 Material Defined

Any substance used to create an object is called a material.

1.3 Historical Context (Pottery)

Mentions the ancient history of pottery in the Indian subcontinent (Lahuradewa, Mehrgarh, Sindhu-Sarasvati Civilization), detailing the techniques (wheel-turning, slips, painting, baking in kilns) and uses (cooking, storage) of clay pottery (terracotta).

2. HOW TO GROUP MATERIALS?

2.1 Classification

The method of arranging objects or materials into groups based on common properties (like shape, colour, hardness, material type) is called classification.

2.2 Variability

One object can be made from different materials, and one material can be used to make multiple objects. Different parts of a single object (like a pen) can be made of different materials (plastic, metal, ink).

2.3 Purposeful Selection

We choose materials to make objects based on the material's properties and the intended use of the object (e.g., a tumbler needs to hold water, so cloth isn't suitable; cooking utensils aren't made of paper).
Example (Balls) Different sports balls (tennis, cricket, hand exercise) are made of different materials suited to their purpose, affecting properties like bounce.

3. WHAT ARE THE DIFFERENT PROPERTIES OF MATERIALS?

Materials are classified based on various properties:

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3.1 Observe and Identify Appearance of Materials

1. Lustre : Materials with a shiny surface are lustrous, often metals (iron, copper, gold). Metals can lose lustre due to air/moisture but shine when freshly cut.
2. Non-lustrous : Materials without shine (paper, wood, rubber). Note : Some non-metals can be made shiny through polishing or coating.

3.2 Which materials are hard?

Materials that are difficult to compress or scratch are hard (stone, metal); those easily compressed or scratched are soft (eraser, sponge, candle). Hardness is relative (rubber is harder than sponge but softer than iron).

3.3 Explore Materials through Which one can see or cannot see

1. Transparent : Materials through which things can be seen clearly (glass, water, air, cellophane).
2. Opaque : Materials through which one cannot see at all (wood, cardboard, metals, walls).
3. Translucent : Materials through which objects can be seen, but not clearly (butter paper, frosted glass).

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3.4 What is soluble in water; what is not?

1. Soluble : Materials that dissolve completely in water (sugar, salt). Water is important for body function because it dissolves many substances. ORS (Oral Rehydration Solution) uses this property.
2. Insoluble : Materials that do not mix or disappear in water (chalk powder, sand, sawdust).
3. Liquids & Gases in Water : Some liquids mix with water (vinegar), others form separate layers (oil). Some gases dissolve in water (oxygen, vital for aquatic life), while others do not.

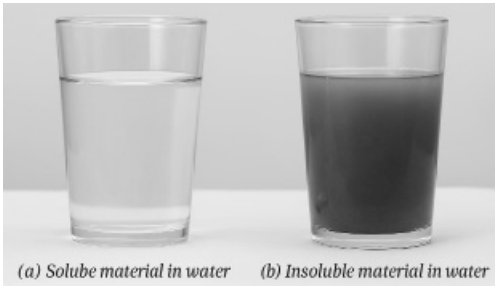

Figure : What disappears, what does not?

3.5 How heavy or light?

This property determines how heavy or light an object is. Heavier objects have more mass. (Note : 'Weight' is often used colloquially for mass).

Figure : Weighing a paper cup containing water

3.6 Space and Volume

1. Occupying Space : All materials/objects occupy space.
2. Volume : The amount of space occupied by an object or substance is its volume. Different amounts of water in identical tumblers show different volumes. Bottles are often labelled with their volume (L or mL).

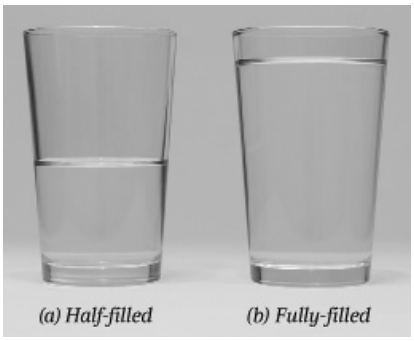

Figure : Glass tumblers with varying levels of water

4. WHAT IS MATTER?

4.1 Definition

Anything that occupies space (has volume) and has mass is called matter. All materials around us are examples of matter.

4.2 Units

1. Mass is measured in grams (g) or kilograms (kg) (SI unit). Volume is measured in litres (L), milliliters (mL), or cubic metres (m^3) (SI unit).
2. Writing Conventions : Explains correct ways to write units and symbols (kg, L, mL, m^3).
3. Importance of Classification : Grouping materials by properties helps study patterns and understand their uses. Mentions the ancient Indian Ayurveda system's classification of matter based on 20 properties (guna).

NCERT ACTIVITY

Activity 6.1 : Let us identify

Make a list of objects you see around and also write the names of the materials they are made up of in Table.

Table : Identify materials

I observe	Materials they are made up of

Based on everyday observations, one can conclude that objects are made up of various materials.

Ans :

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To complete the activity:

1. Look around you (e.g., in the classroom, at home).
2. List several objects that you see in the first column (I observe).
3. In the second column (Materials they are made up of), write down the main material(s) each object is made from.

Example of a Completed Table (Your observations will depend on your surroundings):

I observe	Materials they are made up of
Desk	Wood, Metal
Chair	Plastic, Metal
Textbook	Paper
Pencil	Wood, Graphite
Water Bottle	Plastic / Steel / Copper
Window	Glass, Wood / Aluminium / PVC
Light Bulb	Glass, Metal
Fan	Metal, Plastic

Activity 6.2 : Let us group

1. Group the objects shown in Figure based on any common property, such as shape, colour, hardness, softness, shine, dullness or materials they are made up of.

Figure : Objects around us

2. Which property did you use to group the objects in Activity 6.2?
3. Did your friends group objects based on similar properties?
4. What did you learn from this activity?

Ans :

1. According to the instructions, the objects were grouped based on a common property chosen from the list : shape, colour, hardness, softness, shine, dullness, or the materials they are made up of. (The specific one chosen would depend on the person doing the activity)..
2. The activity description doesn't state whether friends used the same property. It's possible they used the same property (e.g., everyone grouped by shape) or different properties from the list provided (e.g., one used shape, another used colour).
3. From this activity, one learns that objects can be observed for their properties (like shape, colour, hardness, etc.) and can be grouped or classified based on these shared characteristics. It demonstrates the concept of sorting items using common features.

Activity 6.3 : Let us think

Let us think what materials we can use to make a tumbler. Fill in the names of the materials in the spaces provided in Figure.

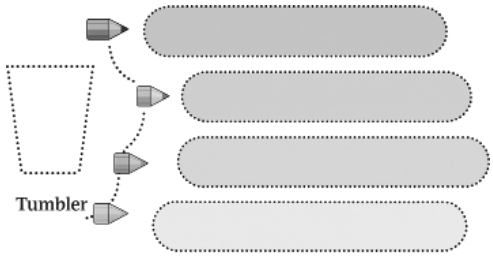

Figure : Materials used to make a tumbler

The activity also includes related thought-provoking questions:

1. Would it be a good idea to use paper-like materials for making cooking utensils?
2. Why cannot a tumbler made of cloth be used for storing water?

Ans :

A tumbler needs to hold water without leaking and be reasonably rigid. Suitable materials include:

Glass, Plastic, Metal (like stainless steel or aluminum)

Ceramic / Pottery

(Possibly very thick, waterproofed paper/ cardboard)

1. A tumbler made of cloth cannot be used for storing water because cloth is porous (has tiny holes) and is usually absorbent. Water would leak through the pores or soak into the fabric, so it cannot hold the water effectively. The primary property needed for a tumbler is to be waterproof or impermeable to water.

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2. No, it would generally be a bad idea to use paper-like materials for making cooking utensils. This is because:
   (i) Paper is not strong enough for many cooking tasks (like stirring or lifting food).
   (ii) Paper is flammable and cannot withstand the high heat involved in cooking.
   (iii) Paper absorbs liquids and loses its structure when wet for extended periods.
   (iv) Cooking utensils need to be durable, heat-resistant, non-absorbent, and easy to clean, properties which paper lacks.

Activity 6.4 : Let us explore

Figure illustrates a variety of balls that are of the same size but made up of different materials.

1. Take each ball and drop it from a fixed height.
2. Note the height to which the ball bounces and record it in Table.
3. Identify the ball that achieves the highest bounce.

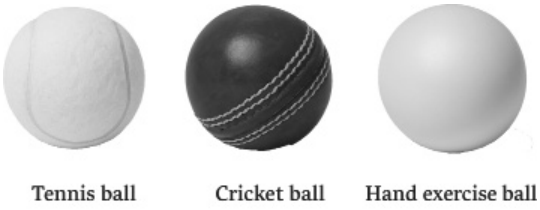

Figure : Different types of balls used for various purposes

Table : Bouncing level of the balls

Ball	Bounce (high, medium or low)
Tennis ball	
Cricket ball	

Ans :

Ball	Bounce (high, medium or low)
Tennis ball	High
Cricket ball	Low

The Tennis ball achieves the highest bounce.
Reason : This is because the Tennis ball is made primarily of rubber, which is a highly elastic material designed to bounce well. The Cricket ball is made of harder, less elastic materials (cork, string, leather) and is designed for durability rather than high bounce.

Activity 6.5 : Let us observe

1. Hold the objects given in Table with your hands. Feel whether the objects are hard or soft.
2. Find out the materials they are made up of.
3. Enter your observations in Table.
4. Compare your observations with the observations of your friends and discuss.

Table : Hard or soft objects and the materials they are made up of

Object	Hard/Soft	Material(s)
Brick	Hard	Baked clay
Water bottle		
Pillow		
Tumbler		
Table		
Sweater		
Any other		

Ans :

Object	Hard/Soft	Material(s)
Brick	Hard	Baked clay
Water bottle	Hard	Plastic, Metal (like steel/aluminum), Glass
Pillow	Soft	Cloth (outer); Cotton, Foam, Feathers (inner)
Tumbler	Hard	Glass, Plastic, Metal (like steel), Ceramic
Table	Hard	Wood, Metal, Plastic, Glass (sometimes tabletop)
Sweater	Soft	Wool, Cotton, Acrylic, other synthetic fibres
Any other	(Depends)	(Depends on the object chosen)

Activity 6.6 : Let us classify

Classify the following objects as transparent, translucent or opaque in Table.

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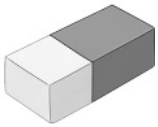
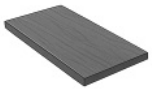
Glass tumbler

Butter paper


Eraser

Frosted glass


Wooden board

Window glass

Table : Classification of objects

Transparent	Translucent	Opaque

Ans :

To classify these objects, we need to understand the terms:

1. Transparent : Objects you can see through clearly (light passes through completely).
2. Translucent : Objects you can see through, but not clearly (light passes through partially/ scattered).
3. Opaque : Objects you cannot see through at all (light does not pass through).

Transparent	Translucent	Opaque
Glass tumbler	Butter paper	Eraser
Window glass	Frosted glass	Wooden board

Activity 6.7 : Let us explore

1. Collect small amounts of sugar, salt, chalk powder, sand and sawdust.
2. Take five glass tumblers and fill them about two-thirds with water.
3. Put a teaspoonful of sugar in the first glass tumbler, salt in the second one, chalk powder in the third, sand in the fourth and sawdust in the fifth glass tumbler.
4. On stirring, predict what will happen in each case.
5. Use a spoon to stir well the contents of each glass tumbler.
6. Wait for a few minutes and watch what happens.
7. Write down your observations in Table.

Table : Mixing different materials in water

Material	Prediction (Will disappear/will not disappear in water)	Observation (Disappears in water/ does not disappear in water)
Sugar		
Salt		
Chalk powder		
Sand		
Sawdust		
Any other		

Ans :

Material	Prediction (Will disappear/will not disappear in water)	Observation (Disappears in water/ does not disappear in water)
Sugar	Will disappear	Disappears in water (Soluble)
Salt	Will disappear	Disappears in water (Soluble)
Chalk powder	Will not disappear	Does not disappear in water (Insoluble - forms suspension)
Sand	Will not disappear	Does not disappear in water (Insoluble - settles down)
Sawdust	Will not disappear	Does not disappear in water (Insoluble - floats)
Any other	(Depends)	(Depends on the substance)

Activity 6.8 : Let us measure

1. Let us take three identical paper cups (or bowls).
2. Fill each cup half with the provided materials:
   Fill one with water and mark it as 'A'.
   Fill the second with sand and mark it as 'B'.
   Fill the third with pebbles and mark it as 'C'.

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3. Predict which one would be heavier and which one would be lighter?
4. Weigh each cup using a balance (Figure) and record the readings in your notebook.

Figure : Weighing a paper cup containing water

5. Compare the data and infer which is heavier or lighter.

Ans :

This activity compares the mass (weight) of equal volumes of different materials.

Prediction :

You need to predict the order from lightest to heaviest based on experience. Most people would predict:
Lightest : Cup A (Water)
Heavier : Cup B (Sand)
Heaviest : Cup C (Pebbles)

Observation/Inference (after weighing) :

When weighed on a balance, you would typically find that for the same volume (half a cup):
Cup C (Pebbles) has the most mass (is the heaviest).
Cup B (Sand) has intermediate mass.
Cup A (Water) has the least mass (is the lightest).
Therefore, the inference confirms the prediction : Pebbles > Sand > Water in terms of heaviness for the same volume.

NCERT EXERCISE

1. Visit your kitchen and observe how your parents have organized various edibles. Can you suggest a better sorting method?

Ans :

Sort items by state and use:

Group	Examples	Container / Shelf & Reason
Dry grains & pulses	rice, wheat, lentils	Airtight jars – keep moisture and insects out
Spices & masalas	turmeric, chilli, cumin	Small transparent bottles on a spice-rack – quick to identify
Snacks	biscuits, chips, nuts	Clip-lid boxes – stay crisp
Breakfast & instant foods	oats, noodles, cereals	Same shelf – saves morning time
Liquids	oil, vinegar, sauces	Taller shelf – avoids leakage onto dry foods
Festive/ occasional items	sweets moulds, dry fruits	Top shelf – frees daily-use space

2. Unscramble the letters (Column I) and match with their properties (Column II).

	Column I		Column II
(i)	T R E M A T	(a)	Objects can be seen clearly through it
(ii)	U L S B E L O	(b)	Occupies space and has mass
(iii)	T N E R P A S N A R T	(c)	Shiny surface
(iv)	E R U S T L	(d)	Mixes completely in water

Ans :

(i-b), (ii-d), (iii-a), (iv-c)

3. The containers used to store materials in shops and homes are usually transparent. Give reasons.

Ans :

Easy identification, quick stock check, early spoilage detection, and customer trust—all possible because light passes through transparent material.

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4. State whether the statements given below are True [T] or False [F]. Correct the False statement(s).
(i) Wood is translucent while glass is opaque. [ ]
(ii) Aluminium foil has lustre while an eraser does not. [ ]
(iii) Sugar dissolves in water whereas sawdust does not. [ ]
(iv) An apple is a matter because it occupies no space and has mass. [ ].

Ans :

(i) False – wood is opaque; glass is transparent.
(ii) True.
(iii) True.
(iv) False – an apple occupies space and has mass.

5. We see chairs made up of various materials, such as wood,iron, plastic, bamboo, cement and stones. Following awesome desirable properties of materials which can be used to make chairs. Which materials used to make chairs fulfil these properties the most?
(i) Hardness (does not bend or shake on sitting even after long use).
(ii) Lightweight (easy to lift or to take from one place to another).
(iii) Does not feel very cold when sitting during winters.
(iv) Can be cleaned regularly and made to look new even after long use.

Ans :

(i) Hardness : Iron (also cement/stone)
(ii) Light-weight : Bamboo or plastic
(iii) Not cold in winter : Wood, bamboo or plastic
(iv) Easy to clean & look new : Plastic or powder-coated/painted iron

6. You need to have containers for collection of :
(i) Food waste,
(ii) Broken glass and
(iii) Wastepaper.
Which materials will you choose for containers of these types of waste? What properties of materials do you need to think of?

Ans :

Choosing good waste containers
1. Food waste : Keep it in a strong plastic dust-bin with a tight lid. Plastic is light, does not rust and can be washed easily, so bad smells and leaks are stopped.
2. Broken glass : Use a metal bucket (or a very thick plastic bin). Metal is hard and cannot be cut by sharp glass pieces, so it is safe.
3. Waste-paper : A cardboard box or a light plastic basket is fine. Paper is dry and light, so we don't need a heavy or waterproof container.
4. What we thought about : strength, safety, whether it leaks, how easy it is to carry and clean, and whether the container reacts with the waste.

7. Air is all around us but does not hinder us from seeing each other. Whereas, if a wooden door comes in between, we cannot see each other. It is because air is _____ and the wooden door is _____. Choose the most appropriate option:
(i) Transparent, opaque
(ii) Translucent, transparent
(iii) Opaque, translucent
(iv) Transparent, translucent

Ans :

(i) Transparent, opaque.
Air is transparent (light passes straight through it) and the wooden door is opaque (it blocks light).

8. Imagine you have two mysterious materials, X and Y. When you try to press material X, it feels rigid and does not change its shape easily. On the other hand, material Y easily changes its shape when you press it. Now, when you mix both materials in water, only material X dissolves completely, while material Y remains unchanged. What can materials X and Y be? Can you identify whether material X is hard or soft? What about material Y? Justify your answer.

Ans :

1. Material X could be common salt. It is hard (keeps its shape when pressed) and soluble (dissolves fully in water).
2. Material Y could be modelling clay. It is soft (changes shape when pressed) and insoluble (stays as it is in water).

9. Who am I? Identify me on the basis of the given properties.
(a) I have lustre.
(b) I can be easily compressed.
(c) I am hard and soluble in water.
(d) You cannot see clearly through me.

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(e) I have mass and volume but you cannot see me.
(ii) Make your own 'Who am I?'

Ans :

(a) Shiny (lustrous) → Aluminium foil
(b) Easy to squeeze → Sponge
(c) Hard and dissolves in water → Table salt
(d) Cannot see clearly through it → Butter paper / frosted glass
(e) Has mass and volume but cannot be seen → Air

10. You are provided with the following materials—vinegar,honey, mustard oil, water, glucose and wheat flour. Make any two pairs of materials where one material is soluble in the other. Now, make two pairs of materials where one material remains insoluble in the other material.

Ans :

Soluble pairs :
1. Glucose + Water (glucose disappears)
2. Vinegar + Water (mixes completely)

Insoluble pairs :
1. Mustard oil + Water (oil forms a separate layer)
2. Wheat flour + Water (flour only makes a paste; it does not dissolve)

MULTIPLE CHOICE QUESTION

1. What is a material as defined in the chapter?
(A) Any object that has a specific shape and color.
(B) Any substance that is used to create an object.
(C) Only substances that are hard and shiny.
(D) Only substances that are naturally occurring.

Ans :

(B) Any substance that is used to create an object.
A material is any substance used to make or construct an object, with common examples including paper, wood, glass, and plastic..

2. According to Rasaratnasamuchchaya, as mentioned in the chapter, what materials are used to make a crucible?
(A) Glass and plastic (B) Wood and paper
(C) Clay and iron (D) Cloth and rubber

Ans :

(C) Clay and iron
A shloka from the Rasaratnasamuchchaya mentions that clay and iron are the materials used to make a crucible, a vessel designed for melting substances.

3. What can be concluded from the everyday observation that objects around us are made of paper, wood, cloth, glass, etc.?
(A) All objects are made from a single type of material.
(B) Objects are made up of various materials.
(C) Only natural materials are used to make objects.
(D) Materials cannot be seen, only the objects they form.

Ans :

(B) Objects are made up of various materials.
Our daily experiences show that different objects are constructed using a diverse range of materials, each chosen for its specific properties suited to the object's purpose.

4. What is classification in the context of objects or materials?
(A) The process of using objects for different purposes.
(B) The method of arranging objects or materials into groups based on common properties.
(C) The study of the chemical composition of materials.
(D) The way objects change their shape over time.

Ans :

(B) The method of arranging objects or materials into groups based on common properties.
Classification is the systematic arrangement of objects or materials into groups or categories based on shared characteristics, similarities, or differences, which helps in organizing and studying them.

5. During which ancient civilization did pottery techniques become further sophisticated, with bright red surfaces painted with black-coloured designs?
(A) Egyptian Civilization
(B) Mesopotamian Civilization
(C) Sindhu-Sarasvati (Harappan) Civilization
(D) Roman Civilization

Ans :

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(C) Sindhu-Sarasvati (Harappan) Civilisation
Pottery techniques became highly advanced during the Sindhu-Sarasvati Civilisation (2600–1900 BCE), featuring decorative painting with geometric patterns and animal designs on bright red surfaces..

6. What determines the choice of material for making a specific object?
(A) Only the color and cost of the material.
(B) The availability of the material in a specific region.
(C) The material's properties and the intended purpose of the object.
(D) The ease with which the material can be broken.

Ans :

(C) The material's properties and the intended purpose of the object.
Materials are chosen based on whether their inherent properties (like strength, flexibility, transparency) are suitable for the function the final object is meant to perform.

7. Why can a tumbler made of cloth NOT be used for storing water?
(A) Cloth is too heavy to make a tumbler.
(B) Cloth is not capable of holding water as it is porous.
(C) Cloth tumblers are not aesthetically pleasing.
(D) Cloth changes color when wet.

Ans :

(B) Cloth is not capable of holding water as it is porous.
A tumbler for storing water needs to be made from a material that is waterproof and can contain liquids. Cloth is porous and would allow water to seep through.

8. What is a key difference in appearance between freshly cut wood and iron?
(A) Freshly cut wood is shiny, while iron is dull.
(B) Freshly cut wood has a distinct appearance quite different from that of iron.
(C) Both freshly cut wood and iron always look identical.
(D) Iron is always soft, while freshly cut wood is always hard.

Ans :

(B) Freshly cut wood has a distinct appearance quite different from that of iron.
Materials often have different visual characteristics. Freshly cut, unpolished wood has a look that is clearly distinguishable from the appearance of a metal like iron.

9. What term is used to describe materials that typically have shiny surfaces?
(A) Opaque
(B) Translucent
(C) Lustrous
(D) Brittle

Ans :

(C) Lustrous
Materials that possess a natural shine or gleam on their surface are said to have a lustrous appearance. Many metals exhibit this property.

10. Which of the following is an example of a non-lustrous material?
(A) Gold
(B) Copper
(C) Paper
(D) Aluminium

Ans :

(C) Paper
Non-lustrous materials are those that do not have a shiny surface. Paper, along with wood and rubber, is cited as an example of a non-lustrous material.

11. Why might some metals lose their lustre and appear dull over time?
(A) Because they absorb too much light.
(B) Due to the effect of air and moisture on their surface.
(C) Because they are polished too frequently.
(D) Because they transform into non-metals.

Ans :

(B) Due to the effect of air and moisture on their surface.
Some metals react with components of the air (like oxygen) and moisture, forming a layer on their surface (e.g., tarnish or rust) that makes them appear dull and lose their original shine.

12. How are soft materials characterized?
(A) Materials that are always shiny and smooth.
(B) Materials which can be compressed or scratched easily.
(C) Materials that are difficult to bend or break.
(D) Materials that are good conductors of heat.

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Ans :

(B) Materials which can be compressed or scratched easily.
Soft materials are those that respond easily to pressure they can be compressed or scratched with little effort.

13. What is the main difference between transparent and opaque materials?
(A) Transparent materials are always hard; opaque materials are always soft.
(B) Things can be seen clearly through transparent materials; not at all through opaque materials.
(C) Transparent materials reflect all light; opaque materials absorb all light.
(D) Transparent materials are man-made; opaque materials are natural.

Ans :

(B) Things can be seen clearly through transparent materials; not at all through opaque materials.
Transparent materials, like clear glass or air, allow light to pass through them without significant scattering, so objects can be seen clearly. Opaque materials, like wood or metal, block light, preventing visibility through them.

14. What are translucent materials?
(A) Materials through which objects can be seen clearly.
(B) Materials through which objects cannot be seen at all.
(C) Materials through which objects can be seen, but not clearly.
(D) Materials that produce their own light.

Ans :

(C) Materials through which objects can be seen, but not clearly.
Translucent materials allow some light to pass through, but they scatter it, so objects viewed through them appear blurry or indistinct. Butter paper is an example.

15. Which of the following is an example of an opaque material?
(A) Clear glass
(B) Water
(C) Air
(D) Wood

Ans :

(D) Wood
Wood is an opaque material because light cannot pass through it, and therefore, one cannot see through a wooden object like a closed door.

16. Ghulan hides behind a wall, Sheeta hides behind a big tree, and Sara hides behind a frosted glass door during a game of hide and seek. Sheeta's younger brother is watching them through a clear glass window.
Which child is hiding behind a translucent material?
(A) Ghulan
(B) Sheeta
(C) Sara
(D) Sheeta's younger brother (observer)

Ans :

(C) Sara
Sara hides behind a frosted glass door. Frosted glass is an example of a translucent material, through which objects can be seen, but not clearly. The wall and tree are opaque, and the clear window is transparent.

17. What happens to materials that are soluble in water when mixed with it?
(A) They float on the surface of the water.
(B) They settle down at the bottom of the container.
(C) They completely disappear or dissolve in the water.
(D) They change the color of the water to black.

Ans :

(C) They completely disappear or dissolve in the water.
Soluble materials are those that mix uniformly with water to form a solution, causing them to seem to disappear as their particles disperse throughout the water.

18. What are materials that do not mix with water and do not disappear even after stirring for a long time called?
(A) Soluble in water
(B) Translucent in water
(C) Insoluble in water
(D) Lustrous in water

Ans :

(C) Insoluble in water
Materials that do not dissolve in water, even after prolonged stirring, and remain as separate particles or layers are termed insoluble in water. Sand is an example.

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19. What are two common household substances that dissolve in water to make shikanji (lemonade)?
(A) Sand and chalk powder
(B) Sugar and salt
(C) Sawdust and oil
(D) Flour and pebbles

Ans :

(B) Sugar and salt
In the example of making shikanji, Ghulan's mother mixes sugar and salt in water and Ghulan notices that these substances disappear after a while, meaning they dissolve.

20. If you mix sand with water and stir it, what will you observe after some time?
(A) The sand will completely dissolve and disappear.
(B) The sand will float on the surface of the water.
(C) The sand will settle down at the bottom as it is insoluble.
(D) The water will turn into a sandy gel.

Ans :

(C) The sand will settle down at the bottom as it is insoluble.
Sand is insoluble in water. When mixed and stirred, the sand particles will temporarily suspend but will eventually settle at the bottom of the container once left undisturbed.

21. The one which is heavier has more mass and the one which is lighter has less mass. What property is being referred to here?
(A) Volume
(B) Density
(C) Mass
(D) Lustre

Ans :

(C) Mass
Mass is the measure of the amount of matter in an object. An object that feels heavier (when comparing equal volumes or in general) typically has more mass than one that feels lighter.

22. What is volume of an object or substance?
(A) The shininess of its surface.
(B) The amount of matter it contains.
(C) The space occupied by the object or substance.
(D) Its ability to dissolve in water.

Ans :

(C) The space occupied by the object or substance.
Volume is the measure of the three-dimensional space that an object or substance takes up. It indicates how much room it occupies.

23. What are the standard SI units used to measure mass, as mentioned in the context of matter?
(A) Litre (L) and milliliter (mL)
(B) Metre (m) and centimeter (cm)
(C) Gram (g) and kilogram (kg)
(D) Newton (N) and Joule (J)

Ans :

(C) Gram (g) and kilogram (kg)
Mass indicates the amount of matter in an object, and it is measured in grams (g) and kilograms (kg), with the kilogram being the SI unit.

24. What are the two fundamental properties that all matter possesses?
(A) Lustre and hardness
(B) Solubility and transparency
(C) Mass and volume (occupies space)
(D) Color and texture

Ans :

(C) Mass and volume (occupies space)
Matter is defined as anything that has mass and takes up space these two characteristics, mass and volume, are what define it.

25. **Assertion (A) :** A tumbler made of glass can hold water.
Reason (R) : Glass is a transparent and hard material.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(B) Both A and R are true, but R is not the correct explanation of A.
A glass tumbler can hold water because glass is non-porous and waterproof. While glass is also transparent and hard, these properties are not the primary reasons it can hold water, though hardness contributes to its structural integrity.

26. Consider the following properties of materials:
1. Lustre (shininess)
2. Hardness (resistance to compression/ scratching)
3. Transparency (ability to see through clearly)

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Which of these properties can be used to classify or group materials?
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(D) 1, 2, and 3
Materials can be grouped based on properties such as appearance (lustre), texture (hardness or softness), and visibility through them (transparency, translucency, or opacity). All three are valid criteria for classification.

27. A student is given three balls of the same size: one made of rubber (tennis ball), one of leather (cricket ball), and one of soft plastic (hand exercise ball). When dropped from the same height, the tennis ball bounces the highest. This activity primarily helps in understanding that:
(A) All balls are equally hard.
(B) Different materials have different properties (e.g., elasticity affecting bounce).
(C) The color of the ball determines its bounce.
(D) Heavier balls always bounce higher.

Ans :

(B) Different materials have different properties (e.g., elasticity affecting bounce).
The varying bounce heights of balls made from different materials, despite being the same size, demonstrate that the choice of material imparts specific properties (like elasticity) to the object, affecting its performance.

28. What is terra-cotta, as mentioned in the context of ancient pottery?
(A) A type of decorative paint.
(B) Baked clay.
(C) A special kiln for baking pottery.
(D) Unfurred, soft clay.

Ans :

(B) Baked clay.
Clay used for pottery was eventually hardened by baking it in kilns, and the resulting material is known as 'terra-cotta'.

29. Why is it not a good idea to use paper-like materials for making cooking utensils?
(A) Paper is too expensive.
(B) Paper is not good at holding food items.
(C) Paper cannot withstand high cooking temperatures and is not waterproof.
(D) Paper utensils are difficult to clean.

Ans :

(C) Paper cannot withstand high cooking temperatures and is not waterproof.
Cooking utensils must be able to endure high heat without burning or deforming and must be able to hold liquids and food. Paper lacks these essential properties.

30. Materials which can be compressed or scratched easily are called:
(A) Hard materials
(B) Lustrous materials
(C) Soft materials
(D) Opaque materials

Ans :

(C) Soft materials
Soft materials are described as those that can be easily squeezed or have surfaces that are easily scratched.

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31. Which of these is an example of a transparent material?
(A) Cardboard
(B) Frosted glass
(C) Air
(D) Metal sheet

Ans :

(C) Air
Air allows light to pass through it clearly, enabling us to see objects without obstruction, making it a transparent material.

32. What is the main difference between a lustrous material and a non-lustrous material?
(A) Lustrous materials are always metals; non-lustrous are never metals.
(B) Lustrous materials have a shiny surface; non-lustrous materials have a dull surface.
(C) Lustrous materials are always hard; non-lustrous materials are always soft.
(D) Lustrous materials are soluble in water; non-lustrous materials are insoluble.

Ans :

(B) Lustrous materials have a shiny surface; non-lustrous materials have a dull surface.
Lustre refers to the shininess of a material's surface. Lustrous materials reflect light well and appear shiny, while non-lustrous materials have a dull appearance and do not reflect light as effectively.

33. All of the following are properties used to classify materials EXCEPT:
(A) Appearance (lustre)
(B) Hardness/Softness
(C) Solubility in water
(D) Electrical conductivity

Ans :

(D) Electrical conductivity
Materials are classified based on properties such as appearance, hardness, transparency, solubility, and mass or volume. While electrical conductivity is a property of materials, it is not a main criterion emphasized in this particular discussion.

34. If a shopkeeper stores spices in one corner of the shop and pulses in another, what principle of organizing materials is being applied?
(A) Arranging by cost
(B) Classification based on common properties or type
(C) Storing by weight
(D) Random placement for easy access

Ans :

(B) Classification based on common properties or type
Grouping similar items together, like spices with spices and pulses with pulses, is an application of classification. This makes it easier to locate and manage items.

35. **Assertion (A) :** Some metals develop a dull appearance over time.
Reason (R) : This is due to the effect of air and moisture reacting with the metal surface.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Many metals lose their initial lustre because their surfaces react with oxygen and moisture in the atmosphere, forming a layer of oxide or tarnish which appears dull.

36. Which statements correctly describe how materials are chosen for objects?
1. The properties of the material are important.
2. The purpose for which the object is to be used is considered.
3. Only the cheapest available material is selected.

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(A) 1 and 2 only
The selection of a material for an object depends critically on its inherent properties (e.g., strength, flexibility) and how well these properties suit the object's intended use. Cost can be a factor, but it's not the sole or primary determinant if the material isn't functional.

37. A student is making a list of materials that can be used to make a window pane through which one can see clearly outside.
Which property is most crucial for the window pane?
(A) Opacity
(B) Translucency
(C) Transparency
(D) Hardness

Ans :

(C) Transparency
For a window pane intended for clear viewing, the most important optical property is transparency, which allows light to pass through without significant scattering, enabling a clear view of objects on the other side.

38. What material property is primarily being tested when you try to scratch the surface of an object with a metal key?
(A) Lustre
(B) Solubility
(C) Hardness
(D) Transparency

Ans :

(C) Hardness
Scratching a material is a common way to assess its relative hardness. Materials that are difficult to scratch are considered hard, while those that scratch easily are softer.

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39. Why does oxygen gas dissolving in water play an important role for aquatic life?
(A) It makes the water shiny and attractive.
(B) It is essential for the survival (respiration) of animals and plants living in water.
(C) It helps to keep the water warm.
(D) It prevents the water from becoming salty.

Ans :

(B) It is essential for the survival (respiration) of animals and plants living in water.
Aquatic organisms, like fish and many underwater plants, require dissolved oxygen for respiration, which is the process of releasing energy from food. The solubility of oxygen in water is thus vital for their survival.

40. In the context of Arrived, what does the term guna refer to ?
(A) Types of food
(B) Properties of matter
(C) Medical treatments
(D) Units of measurement

Ans :

(B) Properties of matter
Arrived uses a framework of 20 properties (guna), arranged in ten opposing pairs, to describe all forms of physical matter, including living organisms and food.

41. What is the SI unit for volume, as stated in the Do you know? box?
(A) Litre (L)
(B) Milliliter (mL)
(C) Cubic metre m^3
(D) Kilogram (kg)

Ans :

(C) Cubic metre m^3
The Do you know? box specifies that the SI unit for volume is the cubic metre, abbreviated as m^3 . While litre and milliliter are common units for volume, cubic metre is the SI standard.

42. How does a soluble material like sugar behave in water compared to an insoluble material like sand?
(A) Sugar floats, while sand sinks.
(B) Sugar dissolves and disappears, while sand does not dissolve and settles.
(C) Sugar changes water color, while sand makes water cloudy.
(D) Sugar makes water hard, while sand makes water soft.

Ans :

(B) Sugar dissolves and disappears, while sand does not dissolve and settles.
Sugar is soluble and its particles disperse uniformly in water, making it seem to disappear. Sand is insoluble and its particles will remain distinct, eventually settling at the bottom.

43. Which of these materials would NOT be suitable for making a container to hold liquids?
(A) Glass
(B) Metal
(C) Plastic
(D) Unglazed clay pot (if pores are not sealed)

Ans :

(D) Unglazed clay pot (if pores are not sealed)
Glass, metal, and most plastics are impervious to liquids. An unglazed clay pot, however, can be porous and allow water to seep through, unless it has been treated or glazed to be waterproof.

44. If an object is described as mridu (soft) and laghu (light in weight) according to Archived properties, what might be an example of such an object?
(A) An iron ball
(B) A cotton ball
(C) A glass marble
(D) A wooden block

Ans :

(B) A cotton ball
A cotton ball is soft (can be easily compressed) and light in weight, fitting the Archived descriptions of mridu and laghu. The other options are generally harder or heavier.

45. **Assertion (A) :** Air is considered matter.
Reason (R) : Air occupies space and has mass.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Matter is defined as anything that occupies space (has volume) and has mass. Air fulfills both these criteria; for example, an inflated balloon shows air occupies space and has mass.

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46. Which of the following is true about materials?
1. An object can be made from different materials.
2. Some materials can be used to make more than one object.
3. All materials have exactly the same properties.

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(A) 1 and 2 only
It's common for an object (like a chair) to be made from various materials (wood, plastic, metal). Similarly, a single material (like plastic) can be used to make many different objects (bottles, toys, pens). Materials differ widely in their properties.

47. A chef needs a material for a frying pan that can withstand high heat and conduct heat efficiently to cook food.
Which material property is most critical for this application?
(A) Transparency
(B) Solubility in water
(C) Ability to withstand high temperatures and conduct heat
(D) Softness

Ans :

(C) Ability to withstand high temperatures and conduct heat
A frying pan must not melt or deform at cooking temperatures and needs to conduct heat effectively from the stove to the food. Copper is a good choice for this, while wood and plastic are not suitable.

48. In ancient Indian pottery, what were slips used for?
(A) To make the clay softer for kneading.
(B) As a fuel for the kilns.
(C) As protective or decorative coats of multiple colours applied to pottery.
(D) To help turn the pottery wheel smoothly.

Ans :

(C) As protective or decorative coats of multiple colours applied to pottery.
About 4000 BCE onwards, Sindhu-Sarasvati potters developed techniques including the application of 'slips', which were protective or decorative coats in various colours.

49. When classifying objects, why is it useful to group them based on the materials they are made of?
(A) It helps determine the age of the objects.
(B) Objects made of the same material often share similar properties and uses.
(C) It is the only way to count the total number of objects.
(D) It makes the objects look more organized aesthetically.

Ans :

(B) Objects made of the same material often share similar properties and uses.
Grouping by material helps in understanding patterns. Objects made from the same material (e.g., all metal objects) will likely share common characteristics (like hardness, lustre, conductivity) and potential uses.

50. The property of a material that describes whether it is rough or smooth to touch is called its:
(A) Lustre
(B) Texture
(C) Hardness
(D) Volume

Ans :

(B) Texture
Texture refers to the surface quality of a material that can be perceived by touch, such as being rough, smooth, coarse or fine.

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MATCHING TYPE QUESTION

51. Match the property of a material in Column A with its correct description in Column B:

	Column A		**Column B**
1.	Lustrous	A.	Allows light to pass through, but objects are not seen clearly
2.	Opaque	B.	Has a shiny surface, typical of metals
3.	Translucent	C.	Does not allow light to pass through at all
4.	Transparent	D.	Allows light to pass through, and objects are seen clearly

(a) 1-B, 2-C, 3-A, 4-D
(b) 1-C, 2-B, 3-D, 4-A
(c) 1-B, 2-A, 3-C, 4-D
(d) 1-D, 2-C, 3-A, 4-B

Ans :

(a) 1-B, 2-C, 3-A, 4-D
Lustrous materials are shiny. Opaque materials block light. Translucent materials allow some light but scatter it. Transparent materials allow clear light passage.

52. Match the material in Column A with its common characteristic property in Column B:

	Column A		**Column B**
1.	Wood	A.	Hard and lustrous
2.	Glass	B.	Soft and can be compressed easily
3.	Iron Nail	C.	Opaque and non-lustrous
4.	Sponge	D.	Transparent and hard

(a) 1-D, 2-C, 3-B, 4-A
(b) 1-C, 2-D, 3-A, 4-B
(c) 1-C, 2-A, 3-D, 4-B
(d) 1-B, 2-D, 3-A, 4-C

Ans :

(b) 1-C, 2-D, 3-A, 4-B
Wood is typically opaque and non-lustrous. Glass is transparent and hard. An iron nail is hard and lustrous (metallic). Sponge is soft and compressible.

53. Match the term related to materials in Column A with its definition in Column B:

	Column A		**Column B**
1.	Material	A.	Anything that occupies space and has mass
2.	Classification	B.	Property of a substance dissolving in water
3.	Matter	C.	Substance used to create an object
4.	Solubility	D.	Arranging objects or materials into groups based on common features

(a) 1-A, 2-D, 3-C, 4-B
(b) 1-C, 2-B, 3-A, 4-D
(c) 1-C, 2-D, 3-A, 4-B
(d) 1-D, 2-C, 3-B, 4-A

Ans :

(c) 1-C, 2-D, 3-A, 4-B
A material is what objects are made from. Classification is grouping. Matter has mass and occupies space. Solubility is the ability to dissolve in water.

54. Match the behavior of a substance when mixed with water (Column A) with an example (Column B):

	Column A		**Column B**
1.	Soluble in water	A.	Sand
2.	Insoluble in water	B.	Vinegar
3.	Forms a separate layer in water	C.	Sugar
4.	Gas that dissolves in water	D.	Oil

(a) 1–C, 2–A, 3–D, 4–B
(b) 1–D, 2–C, 3–A, 4–B
(c) 1–B, 2–D, 3–C, 4–A
(d) 1–A, 2–B, 3–C, 4–D

Ans :

(a) 1–C, 2–A, 3–D, 4–B
Sugar dissolves in water, so it is soluble. Sand does not dissolve, making it insoluble. Oil floats on water and forms a separate layer. Vinegar contains acetic acid, a gas that dissolves in water. Hence, the matching in option (a) are correct.

55. Match the behavior of a substance when mixed with water (Column A) with an example (Column B):

	Column A		**Column B**
1.	Soluble solid in water	A.	Sand
2.	Insoluble solid in water	B.	Oxygen
3.	Liquid that forms a separate layer in water	C.	Sugar
4.	Gas soluble in water	D.	Oil

(a) 1-C, 2-A, 3-D, 4-B
(b) 1-A, 2-C, 3-B, 4-D
(c) 1-C, 2-D, 3-A, 4-B
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(a) 1-C, 2-A, 3-D, 4-B
Sugar is a solid soluble in water. Sand is an insoluble solid. Oil forms a separate layer with water. Oxygen gas dissolves in water, vital for aquatic life.

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VERY SHORT QUESTION

56. What is any substance used to create an object referred to as?

Ans :

Any substance used to create an object is referred to as material.

57. Name one material that the earliest pottery found in the Indian subcontinent was made from.

Ans :

Clay.

58. What is baked clay called?

Ans :

Baked clay is called terra-cotta.

59. What is the method of arranging objects into groups based on common properties called?

Ans :

The method of arranging objects into groups is called classification.

60. What property should a material have to make a tumbler for holding water?

Ans :

The material should be capable of holding water.

61. Can an object be made from different materials?

Ans :

Yes, an object can be made from different materials.

62. What are materials with shiny surfaces said to have?

Ans :

Materials with shiny surfaces are said to have a lustrous appearance.

63. Give one example of a metal.

Ans :

Iron (or copper, zinc, aluminium, gold).

64. What are materials that do not have a shiny surface called?

Ans :

Materials that do not have a shiny surface are called non-lustrous materials.

65. What are materials that can be compressed or scratched easily called?

Ans :

Materials which can be compressed or scratched easily are called soft materials.

66. What are materials through which things can be seen clearly called?

Ans :

Materials through which things can be seen clearly are called transparent materials.

67. Give one example of an opaque material.

Ans :

Wood (or cardboard, metals).

68. What are materials through which objects can be seen, but not clearly, known as?

Ans :

Materials through which objects can be seen, but not clearly, are known as translucent materials.

69. What happens to sugar when it is mixed in water and stirred?

Ans :

Sugar disappears or dissolves in water.

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70. What are materials that do not mix with water called?

Ans :

Materials that do not mix with water are called insoluble in water.

71. Which gas, dissolved in water, is very important for the survival of aquatic animals and plants?

Ans :

Oxygen gas.

72. What property of an object is described by how heavy or light it is?

Ans :

Mass.

73. What does the space occupied by water in a tumbler represent?

Ans :

The space occupied by water represents its volume.

74. What are the two fundamental properties possessed by all materials, leading to the definition of matter?

Ans :

Mass and volume.

75. What is anything that occupies space and has mass called?

Ans :

Anything that occupies space and has mass is called matter.

SHORT ANSWER QUESTION

76. What determines the choice of material for making an object?

Ans :

The choice of material depends on its properties and the purpose for which the object is to be used.

77. Why can a tumbler not be made of cloth for storing water?

Ans :

A cloth tumbler cannot be used for storing water because cloth is not capable of holding water; water would seep through it.

78. What is lustre in materials? Name two metals that have lustre.

Ans :

Lustre is the shiny appearance of a material. Iron and copper are examples of metals that usually have lustre.

79. Why do some metals lose their lustre over time?

Ans :

Some metals lose their lustre and look dull due to the effect of air and moisture on their surfaces over time.

80. Differentiate between hard and soft materials using the property of compressibility.

Ans :

Soft materials can be easily compressed or scratched, like an eraser. Hard materials are difficult to compress or scratch, like a stone.

81. Give an example that shows hardness is a relative property.

Ans :

Rubber is harder than sponge but softer than iron, showing that hardness is relative between different materials.

82. Define transparent materials and give two examples.

Ans :

Transparent materials are those through which things can be seen clearly. Examples include glass, clean water, and air.

83. Define opaque materials and give two examples.

Ans :

Opaque materials are those through which we cannot see at all. Examples include wood, cardboard, and metals.

84. Define translucent materials and give two examples.

Ans :

Translucent materials are those through which objects can be seen, but not clearly. Butter paper and frosted glass are examples.

85. What does it mean when we say a substance is 'soluble' in water? Give an example.

Ans :

A substance is soluble in water if it dissolves completely when mixed with water, like sugar or salt disappearing in water.

86. What does it mean when we say a substance is 'insoluble' in water? Give an example.

Ans :

A substance is insoluble in water if it does not mix or disappear in water even after stirring, like sand or sawdust.

87. Why is water important for the functioning of our body regarding solubility?

Ans :

Water is important because it can dissolve a large number of substances, which aids various bodily functions and transport of nutrients.

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88. Do all liquids mix with water? Explain briefly.

Ans :

No, not all liquids mix with water. Some, like vinegar, mix completely, while others, like oil, form a separate layer.

89. How is an object with more mass different from an object with less mass in terms of heaviness?

Ans :

An object that is heavier has more mass, while an object that is lighter has less mass.

90. What is volume, in the context of matter?

Ans :

Volume is the amount of space occupied by matter. For instance, the space water takes up in a bottle is its volume.

91. What are the standard units mentioned for measuring mass?

Ans :

The standard units mentioned for measuring mass are gram (g) and kilogram (kg).

92. What are the common units mentioned for measuring volume of liquids?

Ans :

Common units for measuring the volume of liquids are litre (L) and millilitre (mL).

93. What is the SI unit for volume and its abbreviation?

Ans :

The SI unit for volume is cubic metre, and its abbreviation is m^3

94. How does the 'materials' in relation to 'matter'?

Ans :

Materials are defined as types of matter that are used in the creation or making of objects.

95. According to Ayurveda, how many principal properties (guna) are used to describe all physical matter?

Ans :

Ayurveda uses 20 principal properties (ten pairs of opposite properties) to describe all physical matter.

LONG ANSWER QUESTION

96. Why is classification of objects and materials useful? Give an example of how grouping is done in a kitchen or a grocery shop.

Ans :

Classification is arranging objects into groups based on common properties, which helps in studying and observing patterns. In a kitchen, similar utensils are placed together. A grocer keeps all spices in one corner and grains in another, making them easy to locate and manage.

97. Explain the concept of lustre with examples of lustrous and non-lustrous materials. Can a non-metallic material appear lustrous?

Ans :

Lustre refers to the shininess of a material's surface. Metals like gold and copper are typically lustrous. non-lustrous materials like wood or paper lack this shine. Yes, a non-metallic material can appear lustrous if its surface is polished or coated with a shiny layer like plastic or wax.

98. Describe the differences between transparent, translucent, and opaque materials. Provide one example for each category.

Ans :

Transparent materials allow clear visibility (e.g., glass).Translucent materials allow partial visibility, objects appear blurry (e.g., frosted glass).Opaque materials do not allow any light to pass through, so objects cannot be seen through them (e.g., a wooden door).

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99. What is meant by 'solubility in water'? Describe an activity to show that some substances are soluble in water while others are not.

Ans :

Solubility is the property of a substance to dissolve in water. To test, take separate glass tumblers with water. Add sugar to one, salt to another, and sand to a third. Stir each. Sugar and salt will dissolve (soluble), while sand will not (insoluble), settling at the bottom.

100. What is matter? What are the two fundamental properties that define matter? Mention the common units used to measure these properties.

Ans :

Matter is anything that occupies space and has mass. The two fundamental properties are mass and volume. Mass, the quantity of matter, is measured in grams (g) or kilograms (kg).Volume, the space occupied, is measured in litres (L) or millilitres (mL) for liquids.

101. How did ancient Indian systems like Ayurveda classify physical matter? Briefly mention some of the properties they considered.

Ans :

Ancient Indian systems like Ayurveda classified matter based on 20 principal properties (guna), consisting of ten pairs of opposites. Some of these properties include heavy (guru) vs. light (laghu), cold (hima) vs. hot (ushna), smooth (shlakshana) vs. rough (khara), and soft (mridu) vs. hard (kathina).

102. Why is it important to choose materials based on their properties for a specific use? Give an example of an object and explain why specific materials are chosen for its parts.

Ans :

Choosing materials based on properties ensures the object functions correctly and lasts. For example, a pen might use plastic for the body (lightweight, easy to mold), metal for the clip (strong, durable), and ink (flows, leaves a mark), each chosen for its specific function and properties.

103. Describe how the Sindhu-Sarasvati (Harappan) Civilization showcased advanced techniques in pottery. What were these pots used for?

Ans :

The Harappan Civilization developed wheel-turned pottery, used pigmentation, applied protective/decorative multi-coloured 'slips', and painted black designs (geometric, animal motifs) on a red surface. Clay was carefully selected, cleaned, kneaded, wheeled, and baked in kilns (terracotta).Pots were used for cooking, and storing food grains, oil, and ghee.

104. Explain why different types of balls used in sports are made of different materials. Relate this to their properties like bounce.

Ans :

Sports balls are made of specific materials due to the desired properties for that sport. For example, a tennis ball needs to be light and bouncy (high bounce), while a cricket ball is harder and has a different bounce characteristic. The material choice affects bounce, weight, and durability.

105. What are the conventions for writing units of mass (kilogram) and volume (litre, millilitre, cubic metre) and their symbols according to the Do you know? sections?

Ans :

For 'kg', no space between 'k' and 'g', no full stop after symbol (unless at sentence end), space between number and 'kg'.'Litre' is 'L', 'millilitre' is 'mL' (no space between m and L). 'Cubic metre' is 'm 3 space between number and unit.

CASE BASED QUESTION

106. A carpenter is making a table. He uses wood for the tabletop and legs, metal screws to join the parts, and varnish to coat the tabletop surface. He notices that the wood is hard, the metal screws are lustrous before use, and the varnish, when dried, gives a smooth and slightly shiny finish.

(i) Why is wood, a hard material, a good choice for a tabletop and legs?

(ii) The metal screws are lustrous. What does this property indicate about the screws, and why might they become dull over time?

(iii) The varnish gives a smooth and shiny finish. Is the tabletop now considered a lustrous material because of the varnish? Explain. (Evaluating)

Ans :

(i) Wood is chosen for its hardness, meaning it is difficult to compress or scratch, providing strength and durability for the table's structure and surface.

(ii) The lustre indicates the screws are likely made of metal. They might become dull due to exposure to air and moisture, causing oxidation or tarnishing.

(iii) The tabletop itself (wood) is non-lustrous, but the varnish coating makes its surface appear shiny. This doesn't make the wood itself lustrous, but rather gives it a polished appearance.

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107. A chef is preparing a salad and a soup. For the salad, she uses fresh vegetables and a glass bowl. For the soup, she uses a metal pot for cooking on a stove. She observes that she can see the colorful vegetables clearly through the glass bowl.

(i) What property of the glass bowl allows the chef to see the vegetables clearly?

(ii) Why would a paper bowl be unsuitable for serving soup?

(iii) The metal pot used for cooking soup is opaque. Why is this property acceptable for a cooking pot, unlike a serving bowl for salad?

Ans :

(i) The glass bowl is transparent, which means it allows light to pass through so things can be seen clearly.

(ii) A paper bowl would be unsuitable for hot soup because paper is not strong enough when wet and would likely absorb the liquid, becoming soggy and leaking.

(iii) Opaqueness is acceptable for a cooking pot because its primary function is to heat contents, not display them. For a salad bowl, transparency can be desirable for presentation.

108. A student mixes sand, salt, and sugar in three separate beakers of water. After stirring, the salt and sugar disappear into the water, but the sand settles at the bottom. The student then pours the salt solution through a cloth filter.

(i) Which substances are soluble in water, and which is insoluble?

(ii) What property of salt and sugar allows them to disappear in water?

(iii) Will the student be able to separate the dissolved salt from the water using the cloth filter? Why or why not?

Ans :

(i) Salt and sugar are soluble in water as they disappear. Sand is insoluble in water as it settles at the bottom.

(ii) Their property of being soluble in water allows them to dissolve and disappear.

(iii) No, the cloth filter will not separate the dissolved salt because the salt particles are too small and are evenly mixed (dissolved) in the water.

109. Ghulan makes lemonade by mixing sugar, salt, and lemon juice in water. He observes that all these ingredients dissolve. Later, he notices water droplets forming on the outside of the cold glass of lemonade on a humid day.

(i) Are sugar, salt, and lemon juice soluble or insoluble in water?

(ii) What is the term for anything that has mass and occupies space, like the lemonade?

(iii) The text discusses a similar phenomenon of water droplets on a cold glass. Where do these water droplets come from?

Ans :

(i) Sugar, salt and lemon juice are soluble in water as they dissolve to make the lemonade.

(ii) Anything that has mass and occupies space, like the lemonade, is called matter.

(iii) These water droplets come from the water vapour present in the surrounding air, which condenses on the cold outer surface of the glass.

110. A factory needs to store different liquids: water, oil and acid. They need to choose appropriate container materials. They have containers made of glass, certain plastics, and uncoated steel.

(i) For storing water, which of the listed materials would generally be suitable and why?

(ii) If oil and water are stored together in one container, they form separate layers. Why is this?

(iii) Why might uncoated steel be unsuitable for storing certain acids?

Ans :

(i) Glass and certain plastics are generally suitable for storing water as they can hold water without reacting with it or leaking.

(ii) Oil and water form separate layers because oil does not mix with (is insoluble in) water.

(iii) Uncoated steel might be unsuitable for storing certain acids because acids can react with metals like steel, causing corrosion and potentially contaminating the acid or damaging the container.

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CHAPTER 7

TEMPERATURE AND ITS MEASUREMENT

SUMMARY

1. HOT OR COLD

Sense of Touch : We often judge if something is hot or cold by touching it. However, this sense can be unreliable.

2. TEMPERATURE

Temperature is a reliable measure of the hotness or coldness of a body. A hotter body has a higher temperature.

3. THERMOMETER

A device used to measure temperature. Clinical thermometers (for body temperature) and laboratory thermometers (for other purposes) are common types.

4. MEASURING TEMPERATURE

4.1 Clinical Thermometer

1. Digital Clinical Thermometer : Commonly used now instead of older mercury thermometers. They measure temperature via contact, run on batteries, and display the reading digitally. Mercury thermometers are being phased out due to mercury's toxicity.

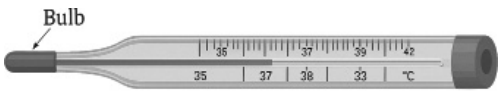
Figure : A digital clinical thermometer

2. Celsius Scale (°C) : The scale commonly used on clinical thermometers for body temperature.
3. Non-Contact Thermometers : Infrared thermometers measure temperature without physical contact, useful for reducing disease spread (e.g., during COVID-19).
4. Normal Body Temperature : Considered to be 37.0 ^{O}C on average for healthy adults, but individual normal temperatures can vary slightly. Body temperature is influenced by age, time of day, and activity level. Human body temperature normally stays between 35^{O}C and 42^{O}C. For children/elderly, temperature can be taken in the armpit (reading is approx. 0.5 ^{O}C to 1 ^{O}C lower).
5. Fahrenheit Scale (°F) : Another scale where normal body temperature is 98.6 ^{O}F (equivalent to 37.0 ^{O}C). Not commonly used in science now.
6. Kelvin Scale (K) : Another scientific scale. The SI unit of temperature is kelvin. Temperature in K = Temperature in °C + 273.15. Degree sign (°) is not used with K.
7. Historical Note : Fever detection before thermometers sometimes relied on pulse rate, but this is not solely reliable.

4.2 Laboratory Thermometer

1. Structure

Typically a long, narrow glass tube sealed at one end, with a bulb containing a liquid (usually coloured alcohol or mercury) at the other. A scale (usually Celsius) is marked along the tube.



2. Range

Commonly ranges from -10 ^{O}C to 110 ^{O}C, but varies. It's important to check the range and the value of the smallest division (determined by the difference between major marks divided by the number of small divisions between them) before use.

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3. Correct Usage

Handle with care, hold vertically (not tilted), immerse the bulb fully without touching the container's bottom/sides, read the temperature while the bulb is immersed, and keep the eye level with the liquid column.

4. Constant Temperatures

Temperature remains constant during boiling and melting (e.g., boiling point of water, melting point of ice). Differences in measured boiling points can occur due to variations in reading technique or potentially altitude.

4.3 Air Temperature

1. Room Thermometers

Simple thermometers often hung on walls to give an approximate room temperature.

Figure : Room thermometer

2. Weather Reports

Maximum and minimum air temperatures for the day are reported in weather forecasts. Air temperature varies daily and seasonally.

3. Importance

Air temperature is a key weather parameter measured at weather stations globally and used for forecasting.

4. Anna Mani

It is Known as the 'Weather Woman of India', she invented many weather instruments, contributing significantly to meteorology and renewable energy research in India.

NCERT ACTIVITY

Activity 7.1 : Let us investigate

1. Take three large containers and label them A, B and C, as shown in Figure.
2. Pour warm water in container A, tap water in B and ice-cold water in C.
3. We will conduct this activity in two parts — prediction and observation.
4. Firstly, predict what will you feel if you
   (i) dip your right hand in A and left hand in C and keep them there for 1–2 minutes.
   (ii) Take out your hands from containers A and C, and place both hands simultaneously in B.

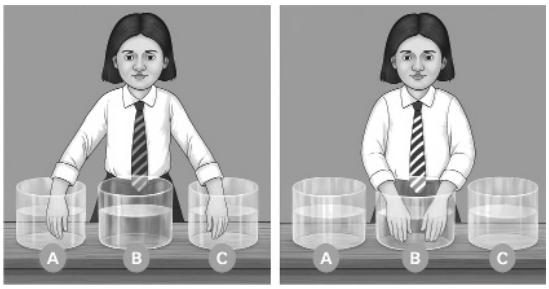

Figure : Feeling hotness or coldness of water by dipping hands

5. Write down your predictions.
   (i) What will my right hand feel on dipping it in B?
   (ii) What will my left hand feel on dipping it in B?
6. Now, conduct the activity and write your observations.

Ans :

Predictions (What you likely guessed):

1. It will probably feel cool or cold. (Because it's moving from warm water to cooler tap water).
2. It will probably feel warm or hot. (Because it's moving from ice-cold water to warmer tap water).

Observations (What you actually feel when you do it):

1. When you put your right hand (from warm water A) into tap water B, it feels cool or cold.
2. When you put your left hand (from cold water C) into tap water B, it feels warm or hot.

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Activity 7.2 : Let us measure

Let us now use a digital clinical thermometer to measure body temperature. You may measure your own temperature as well as the temperature of some of your friends. Talk to your friends to find out who would be willing to get their body temperatures measured by you.

1. Wash your hands and the tip of the digital thermometer with soap and water.
2. Reset the thermometer by pressing the reset button.
3. Place the thermometer under the tongue and close your mouth.
4. Wait till the thermometer makes a beeping sound or flashes a light.
5. Take it out from the mouth and read the temperature on the digital display.
6. Record the temperature in Table.
7. Clean the tip of the thermometer with soap and water, and dry it.
8. Repeat the above steps for measuring the temperatures of your friends.

Table : Body temperatures of 10 persons

S. No.	Name	Temperature(°C)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Ans :

S. No.	Name	Temperature (°C)
1	Your Name	36.8 °C
2	Friend 1	37.1 °C
3	Friend 2	36.9 °C
4	Friend 3	37.0 °C
5	Friend 4	37.2 °C
6	Friend 5	36.7 °C
7	Friend 6	37.0 °C
8	Friend 7	36.9 °C
9	Friend 8	37.3 °C
10	Friend 9	36.8 °C

Activity 7.3 : Let us observe

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Let us try to find the temperature range of a given laboratory thermometer.

1. Take a laboratory thermometer and observe it carefully.
2. Note down the following:
   (i) What is the lowest temperature it can measure?.....
   (ii) What is the highest temperature it can measure?.....
   (iii) So, the range of this thermometer is.....

Now look at the thermometer shown in Figure (a) carefully. Can you tell its range? Its range is from –10 °C to 110 °C.

Figure : (a) A laboratory thermometer

Ans :

1. –10 °C
2. 110 °C
3. –10 °C to 110 °C

Activity 7.4 : Let us observe and calculate

Let us now try to find the smallest value that a given laboratory thermometer can read.

1. Again, take the same laboratory thermometer which you used in Activity 7.3 and observe it carefully.
2. Note down the following:
   (i) How much is the temperature difference indicated between the two bigger marks?.....
   (ii) How many divisions (shown by smaller marks) are there between these two bigger marks?.....
   (iii) How much temperature does one small division indicate?.....
   (iv) So, the smallest value that the thermometer can read is.....

Ans :

1. 10 °C
2. 10 divisions
3. 1 °C
4. 1 °C

Activity 7.5 : Let us measure

1. Take some warm water in a beaker.
2. Dip the thermometer in water so that the bulb is immersed in water (Figure).

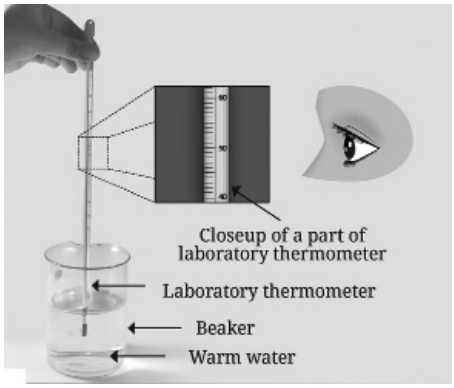

Figure : Measuring temperature of warm water

3. Observe the rise of liquid column in the thermometer.

Ans :

The thermometer reads about 45 °C.

Activity 7.6 : Let us compare

1. Phiban's Science teacher arranged the experimental setup for measuring temperature of boiling water. The temperature readings of the boiling water taken by Phiban and her classmates in Shillong are given in Table .

Table : Temperature of boiling water

Name	Temperature of boiling water (in °C)
Phiban	97.8
Shemphang	98.0
Onestar	97.9
Kloi	98.0
Bandarisha	98.1

2. Compare the temperatures of boiling water recorded by different students.

Why are there differences in their readings? Discuss the possible reasons amongst yourselves. Maybe, the correct way of reading temperature was not followed by all the students.

Activity 7.7 : Let us analyses

1. Read or listen to the weather reports for a place for 10 successive days.
2. Record the maximum and minimum air temperature for each day in Table.
3. Analyses the data in Table.

Table : Maximum and minimum air temperature

S. No.	Date	Maximum air temperature (°C)	Minimum air temperature (°C)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Ans :

S. No.	Date (dd-mm)	Maximum air temperature (°C)	Minimum air temperature (°C)
1	01-06	35	25
2	02-06	36	26
3	03-06	34	24
4	04-06	33	24
5	05-06	35	25
6	06-06	36	26
7	07-06	37	27
8	08-06	36	26
9	09-06	35	25
10	10-06	34	24

NCERT EXERCISE

1. The normal temperature of a healthy human being is close to _____.
(i) 98.6 °C
(ii) 37.0 °C
(iii) 32.0 °C
(iv) 27.0 °C

Ans :

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(ii) 37.0 °C
Average body temperature is about 37 °C, equivalent to 98.6 °F. Temperatures near 98.6 °C would be fatal, while 32 °C or 27 °C indicate severe hypothermia. Hence option (ii) is the .

2. 37 °C is the same temperature as _____.
(i) 97.4 °F
(ii) 97.6 °F
(iii) 98.4 °F
(iv) 98.6 °F

Ans :

(iv) 98.6 °F
Use the conversion formula

$$°F = (9/5 \times °C) + 32.$$

For 37 °C,

$$9 / 5 \times 37 = 66.6$$

$$66.6 + 32 = 98.6\ °F$$

3. Fill in the blanks:
(i) The hotness or coldness of a system is determined by its _____.
(ii) The temperature of ice-cold water cannot be measured by a _____ thermometer.
(iii) The unit of temperature is degree _____.

Ans :

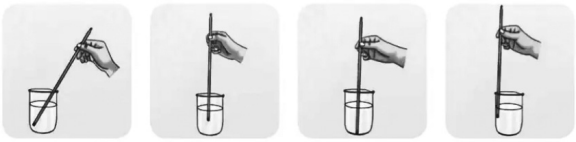
(i) Temperature
(ii) Clinical
(iii) Celsius

4. The range of a laboratory thermometer is usually _____.
(i) 10 °C to 100 °C
(ii) –10 °C to 110 °C
(iii) 32 °C to 45 °C
(iv) 35 °C to 42 °C

Ans :

(ii) –10 °C to 110 °C
A laboratory thermometer must cover temperatures below freezing and above boiling for common experiments, so its scale is typically extended from –10 °C up to 110 °C.

5. Four students used a laboratory thermometer to measure the temperature of water as shown in Figure.

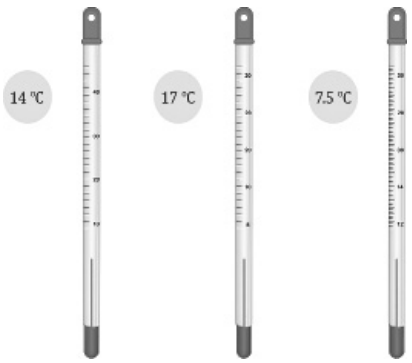


Who do you think followed the correct way for measuring temperature?
(i) Student 1
(ii) Student 2
(iii) Student 3
(iv) Student 4

Ans :

(ii) Student 2
Student 2's method is correct because the thermometer bulb is fully immersed in the water without touching the vessel, the stem is held upright, and the reading is taken with the eye level at the liquid column. This avoids parallax error and ensures the bulb is actually sensing the water's temperature, not the surrounding air or the beaker wall.

6. Colour to show the red column on the drawings of thermometers (Figure) as per the temperatures written below:



Ans :

1. 14 °C : Colour the column up to the long mark labelled 14 °C (one small division below 15 °C).
2. 17 °C : Shade up to the mark two small divisions above 15 °C (that is, the 17 °C mark).
3. 7.5 °C : Fill the column exactly halfway between the 7 °C and 8 °C marks.

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7. Observe the part of thermometer shown in Figure and answer the following questions:

(i) What type of thermometer is it?
(ii) What is the reading of the thermometer?
(iii) What is the smallest value that this thermometer can measure?

Ans :

(i) It is a laboratory thermometer.
(ii) The mercury (red-coloured) column ends at 36 °C on the Celsius scale.
(iii) Between the two bold 10-degree marks there are 10 equal small divisions, so one division equals 1 °C; therefore the smallest value it can measure is 1 °C.

8. A laboratory thermometer is not used to measure our body temperature. Give a reason.

Ans :

A laboratory thermometer is not meant for the body because it must stay upright and dipped in a liquid while you read it, and its wide scale (-10 °C to 110 °C) is too broad for the narrow human-temperature range. A clinical thermometer, with a 35 °C – 42 °C scale and a constriction that locks the reading, is made specially for measuring body temperature.

9. Vaishnavi has not gone to school as she is ill. Her mother has kept a record of her body temperature for three days as shown in Table.

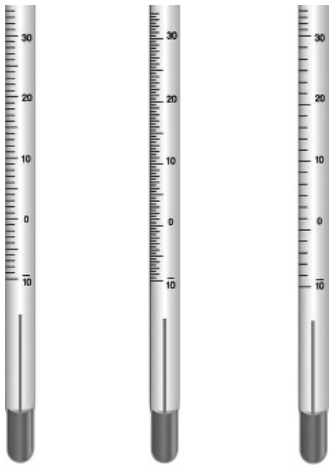
	Temperature at					
DAY	**7 am**	**10 am**	**1 pm**	**4 pm**	**7 pm**	**10 pm**
One	38.0 °C	37.8 °C	38.0 °C	38.0 °C	40.0 °C	39.0 °C
Two	38.6 °C	38.8 °C	39.0 °C	39.0 °C	39.0 °C	38.0 °C
Three	37.6 °C	37.4 °C	37.2 °C	37.0 °C	36.8 °C	36.6 °C

(i) What was Vaishnavi's highest recorded temperature?
(ii) On which day and at what time was Vaishnavi's highest temperature recorded?
(iii) On which day did Vaishnavi's temperature return to normal?

Ans :

(i) Highest temperature : 40.0 °C
(ii) When and where recorded : Day One, at 7 pm
(iii) Day temperature returned to normal (≈ 37 °C) : Day Three

10. If you have to measure the temperature 22.5 °C, which of the following three thermometers will you use (Figure)? Explain.



Ans :

Use the laboratory thermometer that has 0.5 °C divisions and a scale extending well below and above 22 °C (often marked –10 °C to 110 °C). It alone can (i) show 22 °C on its scale and (ii) let you read the extra half-division to reach 22.5 °C. The clinical thermometer is unsuitable because its range starts near 35 °C, and a laboratory thermometer with 1 °C divisions cannot show the half-degree value accurately.

11. The temperature shown by the thermometer in figure is

(i) 28.0 °C
(ii) 27.5 °C
(iii) 26.5 °C
(iv) 25.3 °C

Ans :

(ii) 27.5 °C
The mercury column ends exactly halfway between the 27 °C and 28 °C marks. Each small division on this thermometer represents 0.5 °C, so the halfway point is 27 °C + 0.5 °C = 27.5 °C, matching option (ii).

12. A laboratory thermometer has 50 divisions between 0 °C and 100 °C. What does each division of this thermometer measure?

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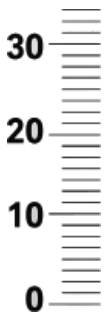
Ans :

Each division measures 2 °C (because 100 °C ÷ 50 divisions = 2 °C per division).

13. Draw the scale of a thermometer in which the smallest division reads 0.5 °C. You may draw only the portion between 10 °C and 20 °C.

Ans :



14. Komal tells you that she has a fever of 101 degrees. Does she mean it on the Celsius scale or Fahrenheit scale?

Ans :

She must be talking about 101 °F.
A body temperature of 101 °C would boil water and is impossible; doctors use the Fahrenheit scale when they say someone has a fever of 101 degrees.

MULTIPLE CHOICE QUESTION

1. What is temperature?
(A) The amount of heat energy contained in a body.
(B) A reliable measure of the hotness or coldness of a body.
(C) The flow of energy from a hotter body to a colder body.
(D) The feeling of warmth or coldness on touching an object.

Ans :

(B) A reliable measure of the hotness or coldness of a body.
Temperature is defined as a reliable and quantifiable measure that indicates how hot or cold an object or a body is. It helps in comparing the degree of hotness between different bodies.

2. What did Phiban use to confirm if Lambok had a fever?
(A) Her hand to touch his forehead.
(B) A wet cloth.
(C) A thermometer.
(D) A traditional herbal remedy.

Ans :

(C) A thermometer.
After feeling Lambok's forehead, Phiban used a thermometer kept in the almirah to measure his temperature accurately and confirm whether he had a fever.

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Why can our sense of touch sometimes be misleading in judging whether a body is hot or cold, as demonstrated in Activity 7.1?
(A) Because our hands are always at a constant temperature.
(B) Because the temperature of objects changes rapidly upon touch.
(C) Because the sensation of hotness or coldness is relative to the previous exposure of our hand.
(D) Because some materials do not conduct heat well.

Ans :

(C) Because the sensation of hotness or coldness is relative to the previous exposure of our hand.
The same water can feel cool to a hand previously in warm water and warm to a hand previously in cold water. This demonstrates that our sense of touch is relative and not always reliable.

4. What is a thermometer?
(A) A device used to measure the heat content of a body.
(B) A device that measures temperature.
(C) An instrument to observe changes in weather.
(D) A scale used to compare the sizes of objects.

Ans :

(B) A device that measures temperature.
A thermometer is an instrument specifically designed and calibrated to measure the temperature of a substance or a body accurately.

5. What type of thermometer is generally used for measuring human body temperature?
(A) Laboratory thermometer
(B) Weather thermometer
(C) Clinical thermometer
(D) Infrared thermometer for industrial use

Ans :

(C) Clinical thermometer
Clinical thermometers are specifically designed for measuring human body temperatures and typically have a temperature range suitable for this purpose. Digital clinical thermometers are commonly used.

6. What is the primary advantage of digital clinical thermometers over traditional mercury thermometers?
(A) Digital thermometers are less expensive.
(B) Digital thermometers measure temperature more slowly.
(C) Digital thermometers pose no risk of mercury poisoning if broken and are easier to read.
(D) Mercury thermometers can measure a wider range of temperatures.

Ans :

(C) Digital thermometers pose no risk of mercury poisoning if broken and are easier to read.
Mercury is a toxic substance. Digital thermometers eliminate this risk, and their digital display makes temperature readings clearer and easier to interpret compared to mercury thermometers.

7. What is the unit of temperature on the Celsius scale?
(A) Degree Fahrenheit $^{\circ}F$
(B) Kelvin (K)
(C) Degree Celsius $^{\circ}C$
(D) Calorie (cal)

Ans :

(C) Degree Celsius $^{\circ}C$
The Celsius scale is a common temperature scale, and its unit of temperature is degree Celsius, denoted by the symbol $^{\circ}C$.

8. What is the normal temperature of a healthy human body generally taken to be on the Celsius scale?
(A) $35.0^{\circ}C$
(B) $37.0^{\circ}C$
(C) $39.0^{\circ}C$
(D) $42.0^{\circ}C$

Ans :

(B) $37.0^{\circ}C$
The average body temperature of a healthy individual is typically regarded as 37.0°C, although minor deviations may be observed among healthy persons.

9. What is a key difference between clinical thermometers and laboratory thermometers in terms of their use?
(A) Clinical thermometers use alcohol; laboratory thermometers use mercury.
(B) Clinical thermometers measure air temperature; laboratory thermometers measure body temperature.
(C) Clinical thermometers are for human body temperature; laboratory thermometers are for other purposes.
(D) Laboratory thermometers are digital; clinical thermometers are analog.

Ans :

(C) Clinical thermometers are for human body temperature; laboratory thermometers are for other purposes.
Clinical thermometers are specifically designed for measuring human body temperatures, while laboratory thermometers are used for a wider range of scientific temperature measurements in experiments.

10. When using a digital clinical thermometer, what should be done immediately before and after use, according to the precautions?
(A) The thermometer should be shaken vigorously.
(B) The tip of the thermometer should be washed with soap and water.
(C) The battery should be removed and reinserted.
(D) The display should be covered with a cloth.

Ans :

(B) The tip of the thermometer should be washed with soap and water.
To maintain hygiene and ensure accurate readings, the tip of a digital clinical thermometer must be washed with soap and water both before and after each use.

11. Why might the body temperature of a perfectly healthy person be slightly different from $37.0^{\circ}C$?
(A) Because thermometers are often inaccurate.
(B) Because $37.0^{\circ}C$ is the maximum normal temperature.
(C) Because normal temperature is an average, and individual variations exist due to factors like age and activity.
(D) Because body temperature only measures illness, not health.

Ans :

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(C) Because normal temperature is an average, and individual variations exist due to factors like age and activity.
The commonly cited $37.0^{\circ}C$ is an average body temperature for healthy individuals. Actual normal temperatures can vary slightly among people due to factors such as age, time of day, and recent physical activity.

12. What is the equivalent of $37.0^{\circ}C$ on the Fahrenheit scale?
(A) $96.8^{\circ}F$
(B) $98.6^{\circ}F$
(C) $99.2^{\circ}F$
(D) $100.4^{\circ}F$

Ans :

(B) $98.6^{\circ}F$
A temperature of 37.0°C on the Celsius scale is equivalent to 98.6°F on the Fahrenheit scale.

13. What is the SI unit of temperature?
(A) Degree Celsius $^{\circ}C$
(B) Degree Fahrenheit $^{\circ}F$
(C) Kelvin (K)
(D) Joule (J)

Ans :

(C) Kelvin (K)
While Celsius and Fahrenheit are commonly used scales, the International System of Units (SI) designates the kelvin (K) as the standard unit for temperature in scientific work.

14. Why is a clinical thermometer NOT suitable for measuring the temperature of boiling water or ice?
(A) Clinical thermometers are not waterproof.
(B) The temperature range of a clinical thermometer is limited and does not cover these extremes.
(C) Clinical thermometers are only accurate for body temperature.
(D) Boiling water and ice can damage the digital display.

Ans :

(B) The temperature range of a clinical thermometer is limited and does not cover these extremes.
Clinical thermometers are designed to measure the relatively narrow range of human body temperatures (typically $35^{\circ}C$. The temperatures of boiling water (around $100^{\circ}C$) and ice ($0^{\circ}C$) fall outside this specialized range.

15. What liquid is generally used in the bulb of a common laboratory thermometer, often colored red for visibility?
(A) Water
(B) Alcohol
(C) Mercury
(D) Glycerine

Ans :

(B) Alcohol
Laboratory thermometers typically use either alcohol (often dyed red for visibility) or mercury as the liquid.

16. A student is using a laboratory thermometer that has 10 divisions between the $0^{\circ}C$ mark and the $10^{\circ}C$ mark. What temperature does one small division on this thermometer indicate?
(A) $0.1^{\circ}C$
(B) $0.5^{\circ}C$
(C) $1^{\circ}C$
(D) $2^{\circ}C$

Ans :

(C) $1^{\circ}C$
If there is a $10^{\circ}C$ difference between the two bigger marks and this range is divided into 10 smaller divisions, then each small division represents a temperature change of $10^{\circ}C/10 = 1^{\circ}C$.

17. When measuring the temperature of warm water with a laboratory thermometer, why should the reading be taken while the thermometer bulb is still immersed in the water?
(A) To prevent the thermometer from breaking.
(B) Because the liquid column might fall quickly once the thermometer is removed from the water.
(C) To ensure the thermometer is held vertically.
(D) Because the glass of the thermometer cools down the water.

Ans :

(B) Because the liquid column might fall quickly once the thermometer is removed from the water.
Laboratory thermometers (especially those without a kink like clinical ones) show the current temperature of their surroundings. If removed from the warm water, the liquid column will quickly adjust to the cooler air temperature, giving an inaccurate reading of the water's temperature.

18. What happens to the temperature of water while it is boiling, or the temperature of ice while it is melting, under constant pressure?

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(A) The temperature continuously increases.
(B) The temperature continuously decreases.
(C) The temperature remains constant during the phase change.
(D) The temperature fluctuates rapidly.

Ans :

(C) The temperature remains constant during the phase change.
During a phase change, such as water boiling into steam or ice melting into water, the temperature of the substance remains constant (e.g., $100^{\circ}C$ for boiling water at sea level, $0^{\circ}C$ for melting ice) until the change is complete.

19. What is a major difference in construction between a typical laboratory thermometer and older mercury clinical thermometers that allows the clinical thermometer to hold its reading after removal from the body?
(A) Laboratory thermometers have a larger bulb.
(B) Clinical mercury thermometers have a kink or constriction near the bulb.
(C) Laboratory thermometers use alcohol, clinical ones use mercury.
(D) Clinical thermometers have a wider temperature range.

Ans :

(B) Clinical mercury thermometers have a kink or constriction near the bulb.
Traditional mercury clinical thermometers have a narrow constriction (kink) in the capillary tube just above the bulb. This kink prevents the mercury from flowing back quickly, allowing the reading to be taken after removing the thermometer. Laboratory thermometers usually lack this feature. (Note: The question specifies older mercury clinical thermometers as digital ones don't have this kink).

20. Which of the following is NOT a precaution to be taken while using a laboratory thermometer?
(A) Handle with care to avoid breakage.
(B) Do not hold it by the bulb.
(C) The bulb should touch the bottom of the beaker for best results.
(D) The thermometer should be held vertically and not tilted.

Ans :

(C) The bulb should touch the bottom of the beaker for best results.
When measuring liquid temperature, the thermometer bulb should be fully immersed in the liquid but should not touch the bottom or sides of the container, as this might give the temperature of the container rather than the liquid.

21. **Assertion (A) :** The sense of touch is not always a reliable measure of hotness or coldness.
Reason (R) : The sensation of temperature by touch is relative and can be influenced by the previous temperature exposure of the skin.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Our perception of temperature through touch is subjective. As demonstrated in Activity 7.1, an object can feel differently hot or cold depending on whether our hand was previously in contact with something warmer or colder, making it unreliable for precise measurement.

22. Consider the following statements about temperature scales:
1. The SI unit of temperature is degree Celsius.
2. On the Fahrenheit scale, the unit of temperature is degree Fahrenheit $^{\circ}F$.
3. The Kelvin scale does not use the degree $^{\circ}$ sign with its unit K.

Which of the above statements is/are correct?
(A) 1 and 2 only (B) 2 and 3 only
(C) 1 and 3 only (D) 1, 2, and 3

Ans :

(B) 2 and 3 only
The SI unit of temperature is Kelvin (K). The unit on the Fahrenheit scale is indeed degree Fahrenheit $^{\circ}$F. The Kelvin scale unit (K) is written without a degree symbol. Therefore, statements 2 and 3 are correct.

23. During the COVID-19 pandemic, screeners used non-contact thermometers to measure people's temperatures from a distance.
These thermometers are also known as:
(A) Mercury thermometers
(B) Alcohol thermometers
(C) Infrared thermometers
(D) Maximum-minimum thermometers

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Ans :

(C) Infrared thermometers
Non-contact thermometers, often used for quick temperature screening from a distance, typically work by detecting infrared radiation emitted by the body. This reduces physical contact and potential disease transmission.

24. What is the significance of washing the tip of a clinical thermometer with soap and water before and after use?
(A) It helps the thermometer to read the temperature more quickly.
(B) It prevents the spread of infections and ensures hygiene.
(C) It calibrates the thermometer for accurate readings.
(D) It keeps the digital display clean and clear.

Ans :

(B) It prevents the spread of infections and ensures hygiene.
Washing the thermometer tip is a crucial hygiene practice to remove any germs or contaminants, thereby preventing the potential spread of infections when the thermometer is used by different individuals or on different body parts.

25. What is the typical temperature range of a laboratory thermometer?
(A) $0^{\circ}C$
(B) $35^{\circ}C$
(C) $-10^{\circ}C$
(D) $-50^{\circ}C$

Ans :

(C) $-10^{\circ}C$
Laboratory thermometers usually have a temperature range from –10°C to 110°C, making them suitable for a wide range of scientific experiments.

26. When placing a digital thermometer in the armpit for measuring body temperature, how does the reading generally compare to the actual core body temperature?
(A) It is exactly the same as the core body temperature.
(B) It is about $0.5^{\circ}C$ higher than the core body temperature.
(C) It is about $0.5^{\circ}C$ lower than the core body temperature.
(D) It is always $2^{\circ}C$ lower than the core body temperature.

Ans :

(C) It is about $0.5^{\circ}C$ lower than the core body temperature.
The temperature measured in the armpit, known as the axillary temperature, is typically 0.5°C to 1°C lower than the core body temperature.

27. How does the writing convention for the unit Kelvin (K) differ from Celsius $^{\circ}C$ and Fahrenheit $^{\circ}F$?
(A) Kelvin uses a lowercase 'k', while Celsius and Fahrenheit use uppercase.
(B) The degree sign $^{\circ}$ is not written with K.
(C) Kelvin is always written with a full stop after it.
(D) Celsius and Fahrenheit do not leave a space between the number and unit.

Ans :

(B) The degree sign $^{\circ}$ is not written with K.
While Celsius and Fahrenheit use the degree symbol (e.g., 25°C, 77°F), the kelvin (K) is written without the degree sign for example, 273 K.

28. When using a laboratory thermometer to measure the temperature of a liquid, which of these actions should be AVOIDED?
(A) Holding the thermometer vertically.
(B) Ensuring the bulb is fully immersed in the liquid.
(C) Allowing the bulb to touch the bottom or sides of the container.
(D) Reading the temperature while the bulb is still in the liquid.

Ans :

(C) Allowing the bulb to touch the bottom or sides of the container.
The thermometer bulb should measure the liquid's temperature, not the container's. Touching the bottom or sides might give an inaccurate reading influenced by the container's temperature.

29. If a weather report states the maximum air temperature for the day, what does this information primarily indicate?
(A) The coldest point reached during the day.
(B) The average temperature throughout the day.
(C) The highest temperature the air reached during that day.
(D) The temperature inside buildings.

Ans :

(C) The highest temperature the air reached during that day.

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The maximum air temperature reported in weather forecasts refers to the peak or highest temperature recorded in the air for that specific day and location.

30. **Assertion (A) :** Mercury thermometers are being replaced by digital thermometers.
Reason (R) : Mercury is an extremely toxic substance and difficult to dispose of if the thermometer breaks.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
The toxicity of mercury and the environmental hazard it poses upon breakage are significant reasons for the shift towards safer digital thermometers for temperature measurement.

31. Which of the following are generally true about using a digital clinical thermometer?
1. It runs on batteries.
2. It is placed in contact with the person's body.
3. It should be held by the tip while taking a reading.

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(A) 1 and 2 only
Digital clinical thermometers are battery-operated and require contact with the body (e.g., under the tongue) to measure temperature. Holding it by the tip is a precaution to avoid.

32. A student is asked to measure the temperature of melting ice. They have a clinical thermometer and a laboratory thermometer.
Which thermometer should they use and why?
(A) Clinical thermometer, because it is more accurate for low temperatures.
(B) Laboratory thermometer, because its range typically includes $0^{\circ}C$ and is designed for such purposes.
(C) Either thermometer, as both will give the same reading.
(D) Clinical thermometer, but only after warming it up.

Ans :

(B) Laboratory thermometer, because its range typically includes $0^{\circ}C$ and is designed for such purposes.
A clinical thermometer's range (e.g., $35^{\circ}C$) does not extend down to $0^{\circ}C$. A laboratory thermometer, with a typical range like $-10^{\circ}C$, is appropriate for measuring the temperature of melting ice.

33. What is absolute zero ?
(A) The boiling point of water on the Kelvin scale.
(B) The lowest possible temperature, close to $-273.15^{\circ}C$ (0 kelvin).
(C) The temperature at which mercury freezes.
(D) The normal temperature of the human body in kelvin.

Ans :

(B) The lowest possible temperature, close to $-273.15^{\circ}C$ (0 kelvin).
Absolute zero is the theoretical lowest limit of temperature, equivalent to 0 kelvin or approximately $-273.15^{\circ}C$. At this temperature, atomic motion would be minimal.

34. If you are reading a laboratory thermometer, why is it important to keep your eye level with the top of the liquid column?
(A) To prevent the liquid from evaporating.
(B) To avoid parallax error and ensure an accurate reading.
(C) To keep the thermometer stable.
(D) To magnify the scale markings.

Ans :

(B) To avoid parallax error and ensure an accurate reading.
Reading a thermometer scale from an angle (above or below the liquid level) can lead to a parallax error, where the reading appears different from its true value. Eye-level reading minimizes this.

35. The Celsius, Fahrenheit and Kelvin scales are named in honour of:
(A) The places where they were first used.
(B) The materials used in the first thermometers.
(C) The scientists who developed these scales.
(D) The phenomena they were designed to measure.

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Ans :

(C) The scientists who developed these scales.
The three common temperature scales Celsius, Fahrenheit, and Kelvin are named in honor of the scientists who played key roles in their development.

36. In Activity 7.1, when both hands are placed simultaneously in container B (tap water) after being in warm water
(A) and ice-cold water (C) respectively, how does the water in B feel to each hand?
(A) Warm to both hands.
(B) Cold to both hands.
(C) Cold to the hand from A, and warm to the hand from C.
(D) Warm to the hand from A, and cold to the hand from C.

Ans :

(C) Cold to the hand from A, and warm to the hand from C.
The hand previously in warm water (A) will perceive the tap water (B) as cool. The hand previously in ice-cold water (C) will perceive the same tap water (B) as warm, demonstrating the relativity of touch.

37. Which temperature scale is NOT commonly used in most scientific studies anymore ?
(A) Celsius scale
(B) Kelvin scale
(C) Fahrenheit scale
(D) None of the above

Ans :

(C) Fahrenheit scale
The Fahrenheit scale is no longer commonly used in scientific studies, with Celsius—and especially Kelvin—being the preferred temperature scales in scientific contexts..

38. Which of these is NOT a factor mentioned that can influence normal human body temperature?
(A) Age
(B) Time of the day
(C) Activity level
(D) Blood type

Ans :

(D) Blood type
Factors such as age, time of day, and activity level can cause slight variations in a healthy person's body temperature, while blood type is not considered one of these influencing factors.

39. If a laboratory thermometer shows a temperature difference of $20^{\circ}C$ between two major marks, and there are 10 small divisions between them, what does one small division represent?
(A) $0.2^{\circ}C$
(B) $0.5^{\circ}C$
(C) $1^{\circ}C$
(D) $2^{\circ}C$

Ans :

(D) $2^{\circ}C$
If a $20^{\circ}C$ range is divided into 10 equal smaller divisions, then each small division represents a temperature interval of $20^{\circ}C/10 = 2^{\circ}C$.

MATCHING TYPE QUESTION

40. Match the fundamental property of matter in Column A with its unit of measurement or description in Column B:

	Column A		**Column B**
1.	Mass	A.	Measured in Litres (L) or milliliters (mL)
2.	Volume	B.	Describes if a material is shiny or dull
3.	Lustre	C.	Measured in kilograms (kg) or grams (g)
4.	Hardness	D.	Describes resistance to compression or scratching

(a) 1-D, 2-A, 3-C, 4-B
(b) 1-C, 2-B, 3-A, 4-D
(c) 1-A, 2-C, 3-B, 4-D
(d) 1-C, 2-A, 3-B, 4-D

Ans :

(d) 1-C, 2-A, 3-B, 4-D
Mass is measured in kg or g. Volume is measured in L or mL. Lustre refers to shininess. Hardness is resistance to scratching or compression.

41. Match the type of thermometer in Column A with its primary use or characteristic in Column B:

	Column A		**Column B**
1.	Clinical Thermometer	A.	Measures temperature without physical contact

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2.	Laboratory Thermometer	B.	Used to measure human body temperature $-10^{\circ}C$
3.	Digital Thermometer	C.	Has a wide range, e.g.,
4.	Infrared Thermometer	D.	Displays temperature numerically, often battery operated

(a) 1-B, 2-C, 3-D, 4-A
(b) 1-C, 2-B, 3-A, 4-D
(c) 1-B, 2-D, 3-A, 4-C
(d) 1-D, 2-C, 3-B, 4-A

Ans :

(a) 1-B, 2-C, 3-D, 4-A
Clinical thermometers measure body temperature. Laboratory thermometers have a wider range for various experiments. Digital thermometers show numerical readings. Infrared thermometers measure temperature from a distance.

42. Match the temperature scale in Column A with its unit or a key reference point in Column B:

	Column A		**Column B**
1.	Celsius Scale	A.	Normal human body temperature is 98.6 on this scale
2.	Fahrenheit Scale	B.	SI unit of temperature
3.	Kelvin Scale	C.	Unit is $^{\circ}C$ water freezes at 0 on this scale
4.	Normal Body Temperature	D.	Approximately $37.0^{\circ}C$

(a) 1-D, 2-A, 3-C, 4-B
(b) 1-C, 2-B, 3-A, 4-D
(c) 1-A, 2-C, 3-B, 4-D
(d) 1-C, 2-A, 3-B, 4-D

Ans :

(d) 1-C, 2-A, 3-B, 4-D
Celsius scale uses $^{\circ}C$. Fahrenheit scale has $98.6^{\circ}F$ as normal body temperature. Kelvin (K) is the SI unit. Normal body temperature is about $37.0^{\circ}C$.

43. Match the term related to temperature in Column A with its correct definition or description in Column B:

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	Column A		**Column B**
1.	Temperature	A.	Highest and lowest temperatures recorded for a day
2.	Thermometer	B.	Average body temperature of many healthy people
3.	Normal Temperature (Human)	C.	A reliable measure of hotness or coldness of a body
4.	Max/Min Air Temperature	D.	A device used for measuring temperature

(a) 1-B, 2-D, 3-A, 4-C
(b) 1-C, 2-A, 3-D, 4-B
(c) 1-C, 2-D, 3-B, 4-A
(d) 1-D, 2-C, 3-B, 4-A

Ans :

(c) 1-C, 2-D, 3-B, 4-A
Temperature measures hotness/coldness. A thermometer is the measuring device. Normal human temperature is an average. Max/min air temperatures are part of weather reports.

44. Match the precaution or correct method for using a thermometer (Column A) with the type of thermometer it primarily applies to or the reason (Column B):

	Column A		**Column B**
1.	Wash tip with soap and water before/after use	A.	To avoid inaccurate readings due to parallax
2.	Read temperature while bulb is immersed	B.	Important for hygiene when using a clinical thermometer
3.	Eye level with liquid column	C.	Necessary for most laboratory thermometers as level falls quickly
4.	Do not hold by the bulb	D.	To prevent breakage or influence from hand's heat on a laboratory thermometer

(a) 1-C, 2-B, 3-D, 4-A
(b) 1-B, 2-D, 3-A, 4-C
(c) 1-A, 2-C, 3-B, 4-D
(d) 1-B, 2-C, 3-A, 4-D

pressure is lower, causing water to boil at a lower temperature.

94. Who was Anna Mani and what was her significant contribution to India in the field of meteorology? Why is accurate weather measurement important?

Ans :

Anna Mani was an Indian physicist and meteorologist known as the Weather Woman of India. She designed and standardized numerous weather instruments, reducing India's dependence on imports. Accurate weather measurement is vital for forecasting, agriculture, disaster management, and understanding climate change.

CASE BASED QUESTION

95. Phi ban wants to measure the temperature of tap water and then the temperature of boiling water for a science experiment. She has a clinical thermometer and a laboratory thermometer.

(i) Which thermometer should Phi ban use to measure the temperature of tap water? Why?

(ii) Can Phi ban use the clinical thermometer to measure the temperature of boiling water? Explain your answer. (Evaluating)

(iii) If the laboratory thermometer reads 25 ºC for tap water, what precautions should she take while measuring?

Ans :

(i) Phi ban should use the laboratory thermometer. Tap water temperature is likely within its range, and clinical thermometers are for body temperature only.

(ii) No, Phi ban cannot use the clinical thermometer for boiling water. Boiling water (around 100 °C) is far above the maximum temperature range of a clinical thermometer (around 42 °C).

(iii) She should ensure the bulb is immersed in water, not touching the container, hold it vertically, and read the scale at eye level while immersed.

96. A weather report states that the maximum temperature for the day in Delhi was 40 ºC and the minimum was 28 ºC. Lam bok wonders how these temperatures are measured.

(i) What kind of thermometer is likely used at weather stations to measure air temperature?

(ii) Why does the air temperature vary between maximum and minimum in a single day?

(iii) How is this air temperature data useful beyond just knowing if it's hot or cold?

Ans :

(i) Weather stations use specialized thermometers, often maximum-minimum thermometers or electronic sensors, designed for measuring air temperatures accurately.

(ii) Air temperature varies due to the Earth's rotation, leading to changes in the amount of solar radiation received at different times of the day.

(iii) This data is crucial for weather forecasting, agricultural planning, understanding climate patterns, and public health advisories during extreme weather.

97. A digital clinical thermometer shows a reading of 98.6 ºF for a healthy person. Another healthy person's temperature is measured as 37.2 ºC using a different digital clinical thermometer.

(i) Are these two temperatures significantly different in indicating health status?

(ii) What is the SI unit of temperature, and is it commonly displayed on clinical thermometers?

(iii) If a child's temperature is taken in the armpit and reads 37.5 ºC, what might be closer to their actual core body temperature?

Ans :

(i) No, 98.6 °F is equivalent to 37.0 °C. A reading of 37.2 °C is very close and within the normal healthy range.

(ii) The SI unit of temperature is Kelvin (K). It is not commonly displayed on clinical thermometers, which usually show Celsius or Fahrenheit.

(iii) The actual core body temperature might be closer to 38.0 °C or 38.5 °C, as armpit readings are typically 0.5 °C to 1 °C lower.

98. In a school laboratory, students are asked to find the smallest temperature value a given laboratory thermometer can measure. The marks 20 ° C and 30 ºC are visible, with 10 small divisions between them.

(i) What is the temperature difference between the two bigger marks (20 ºC and 30 ºC)?

(ii) How much temperature does one small division on this thermometer indicate?

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Ans :

The range is typically from –10 °C to 110 °C.

61. When using a laboratory thermometer to measure water temperature, should the bulb touch the bottom of the beaker?

Ans :

No, the bulb should not touch the bottom or the sides of the beaker.

62. What happens to the temperature of water while it is boiling?

Ans :

The temperature of water remains constant while it is boiling.

63. Who was Anna Mani, also known as the 'Weather Woman of India'?

Ans :

Anna Mani was an Indian scientist who invented and built many weather measurement instruments.

64. What is the lowest possible temperature called, which is close to -273.15 °C?

Ans :

It is called absolute zero.

SHORT ANSWER QUESTION

65. Why can we not always rely on our sense of touch to judge if a body is hot or cold?

Ans :

Our sense of touch is subjective and can be misleading, as it depends on the relative temperatures our hands were previously exposed to.

66. What is temperature and how does it relate to the hotness of two bodies?

Ans :

Temperature is a reliable measure of hotness or coldness. A hotter body has a higher temperature than a colder body.

67. What are the main differences in use between a clinical thermometer and a laboratory thermometer?

Ans :

Clinical thermometers are specifically designed to measure human body temperature, while laboratory thermometers are used for various scientific purposes, measuring a wider range of temperatures.

68. Why are digital clinical thermometers preferred over older mercury thermometers?

Ans :

Digital thermometers are preferred because they do not contain toxic mercury, making them safer. Their digital display is also easier to read accurately.

69. What are non-contact thermometers, and why were they particularly useful during the COVID-19 pandemic?

Ans :

Non-contact (infrared) thermometers measure temperature without touching a person's body. They were useful during the pandemic to reduce the risk of spreading disease.

70. Is the normal body temperature of 37.0 °C exactly the same for every healthy person? Explain briefly.

Ans :

No, 37.0 °C is an average. A healthy person's normal temperature can be slightly different, influenced by age, time of day, and activity.

71. How does the Fahrenheit scale represent normal human body temperature, equivalent to 37.0 °C?

Ans :

A temperature of 37.0 °C on the Celsius scale is equivalent to 98.6 °F on the Fahrenheit scale.

72. How can temperature in Celsius be converted to Kelvin?

Ans :

Temperature in Kelvin scale = Temperature in Celsius scale + 273.15. This is a fundamental conversion in scientific work.

73. Describe the basic structure of a typical laboratory thermometer found in schools.

Ans :

It consists of a long, narrow, uniform sealed glass tube with a bulb at one end containing a liquid (alcohol or mercury) and a Celsius scale marked along the tube.

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CHAPTER 8

A JOURNEY THROUGH STATES OF WATER

SUMMARY

1. INVESTIGATING WATER'S DISAPPEARING ACT

1. Initial Observation : Aavi and Thrive notice water puddles disappearing from the playground and wonder where the water goes. They consider if it seeps into the ground or evaporates.
2. Evaporation : The process where water converts into its gaseous state (water vapour) is introduced. Examples include drying clothes, mopped floors, sweat, and water sprinkled on a hot pan turning to steam (visible due to tiny water droplets).
3. Conclusion for Puddles : The disappearance of water from puddles is likely due to both seepage into the ground and evaporation into the air. Hand sanitizer also disappears due to evaporation.

2. ANOTHER MYSTERY

1. Observation : Water droplets appear on the outer surface of a glass tumbler containing ice and cold water.

Figure : A glass tumbler containing cold water and ice cubes

2. Possible Reasons & Reasoning : Students discuss reasons : ice melting and coming out (unlikely), water seeping through the glass (refuted by checking water level, especially in a narrow bottle, or using water at room temp), or something else.
3. Condensation : The process where water vapour from the air turns into liquid water upon contact with a cold surface is introduced. Dew drops on plants are another example.
4. Humidity : The amount of water vapour in the air.

3. WHAT ARE THE DIFFERENT STATES OF WATER?

Water commonly exists in solid (ice), liquid (water), and gaseous (water vapour/steam) states.

3.1 Properties Comparison

1. Ice (Solid) : Has a fixed shape, does not flow or spread easily.
2. Water (Liquid) : Takes the shape of the container (no fixed shape), flows, spreads, but maintains a constant volume.
3. Water Vapour (Gas) : Has no fixed shape, spreads out to fill the entire available space. It's invisible but present in the air around us.
4. Other Substances : Other substances like wax, oil, and ghee also exist in different states. Examples of solids (stone, wood), liquids (milk, oil) and gases (oxygen, carbon dioxide) are given. The smell of cooking food spreading demonstrates gases filling space.

4. HOW CAN WE CHANGE THE STATES OF WATER?

1. Heating & Cooling : Supplying heat causes changes like melting (solid to liquid) and evaporation (liquid to gas). Removing heat (cooling) causes changes like freezing (liquid to solid) and condensation (gas to liquid).
2. Melting : Solid to liquid (e.g., ice to water, solid wax to liquid wax).
3. Freezing : Liquid to solid (e.g., water to ice, liquid coconut oil solidifying in winter).

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place both in lukewarm water, the first hand will feel the lukewarm water as cold, and the second will feel it as warm. This shows its unavailability.

86. What is a clinical thermometer? Describe the features of a modern digital clinical thermometer and list two precautions for its correct use.

Ans :

A clinical thermometer is used to measure human body temperature. Modern digital ones display temperature numerically, run on batteries, and use heat sensors.
Precautions:
Wash the tip with soap and water before and after use, and read the instruction manual for proper operation and placement (e.g., under the tongue).

87. What are the Celsius, Fahrenheit, and Kelvin scales of temperature? Mention the SI unit of temperature and explain its significance.

Ans :

Celsius (°C) and Fahrenheit (°F) are common temperature scales, with Celsius used widely in science. Kelvin (K) is the SI unit of temperature, crucial in scientific work because it starts from absolute zero, the lowest possible temperature. Temperatures are converted for different applications.

88. Describe the correct procedure for measuring the temperature of warm water using a laboratory thermometer, highlighting at least three key steps for accuracy.

Ans :

1. Hold the thermometer vertically, immersing the bulb completely in the warm water without it touching the container's bottom or sides.
2. Wait for the liquid column to stabilize.
3. Keep your eye level with the top of the liquid column and read the temperature while the thermometer is still immersed in the water.

89. What is normal body temperature? Explain why an individual's body temperature might vary slightly from this value and still be considered healthy.

Ans :

Normal body temperature (average 37.0 °C or 98.6 °F) is an average for healthy adults.

An individual's temperature can vary slightly due to factors like age (children often slightly higher), time of day (lower in morning), and recent physical activity, without indicating illness.

90. Why was mercury commonly used in older thermometers, and what are the significant disadvantages that led to its replacement by digital alternatives?

Ans :

Mercury was used because it expands uniformly with temperature and is easily visible. However, mercury is highly toxic. If a mercury thermometer breaks, the spilled mercury poses a serious health and environmental hazard, making its disposal difficult. Digital thermometers avoid this risk.

91. Explain how a non-contact infrared thermometer works and why it became a preferred tool in public health scenarios like pandemics.

Ans :

Non-contact infrared thermometers measure the infrared radiation emitted by a person's body (usually the forehead) to determine temperature without physical contact. This reduces the risk of cross-contamination and disease transmission, making them ideal for quick, safe screening in public health emergencies.

92. What is meant by the 'range' and 'smallest readable value' (or least count) of a laboratory thermometer? Why is it important to know these before using one?

Ans :

The 'range' is the interval between the lowest and highest temperatures the thermometer can measure. The 'smallest readable value' is the smallest temperature change it can detect, indicated by its smallest division. Knowing these ensures the thermometer is suitable for the expected temperature and read accurately.

93. How does the boiling point of water observed by students in Shillong (as mentioned in Table) compare to the standard 100 ºC? What could be a primary reason for this difference? (Evaluating)

Ans :

The boiling point observed in Shillong (around 97.8 °C - 98.1 °C) is slightly lower than the standard 100 °C. This is primarily because Shillong is at a higher altitude, where atmospheric

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74. What is meant by the 'range' of a laboratory thermometer?

Ans :

The 'range' of a laboratory thermometer refers to the lowest and highest temperatures that the thermometer is designed to measure accurately.

75. How do you find the smallest value that a laboratory thermometer can read from its markings?

Ans :

Note the temperature difference between two bigger marks and count the number of smaller divisions between them. Divide the difference by the number of divisions.

76. List two precautions to be taken while handling a laboratory thermometer.

Ans :

Handle it with care to avoid breakage. Do not hold it by the bulb when taking readings, as this can affect accuracy.

77. When measuring the temperature of warm water with a laboratory thermometer, how should it be held and when should the reading be taken?

Ans :

The thermometer should be held vertically, with the bulb fully immersed but not touching the container. The reading must be taken while the thermometer is still immersed.

78. What happens to the reading of a laboratory thermometer if it is taken out of warm water before noting the temperature?

Ans :

If taken out of warm water, the liquid column in a laboratory thermometer begins to fall quickly, so the reading will be inaccurate.

79. What did Anna Mani contribute to the field of weather measurement in India?

Ans :

Anna Mani invented and built a large number of weather measurement instruments, reducing India's reliance on other nations for such technology.

80. Why are weather reports that include maximum and minimum air temperatures important?

Ans :

These reports are important for daily planning, agriculture and because air temperature data, along with other parameters is used for making weather forecasts.

81. How does the temperature of ice behave while it is melting?

Ans :

The temperature of ice remains constant at its melting point (e.g., 0 °C at standard pressure) while it is melting.

82. Briefly explain why a clinical thermometer cannot be used to measure the temperature of boiling water.

Ans :

The temperature of boiling water (around 100 °C) is outside the limited measurement range of a clinical thermometer (typically 35 °C to 42 °C).

83. What are the conventions for writing the symbols for degree Celsius, degree Fahrenheit, and kelvin?

Ans :

Symbols are °C, °F and K. The degree sign (°) is used with Celsius and Fahrenheit but not with Kelvin. All symbols are capital letters.

84. Why might the temperature measured in the armpit be slightly lower than the actual body temperature?

Ans :

Temperature measured in the armpit can be about 0.5 °C to 1 °C lower because the armpit is an external surface, not reflecting the core body temperature as accurately as an oral reading.

LONG ANSWER QUESTION

85. Explain why our sense of touch is not a reliable method for determining how hot or cold an object is. Describe a simple activity that demonstrates this.

Ans :

Our sense of touch is relative and can be easily fooled. For example, if you place one hand in warm water and the other in cold water, then

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(iii) What is the smallest value this thermometer can accurately read?

Ans :

(i) The temperature difference is

$$30\ ^{o}C - 20\ ^{o}C = 10\ ^{o}C.$$

(ii) One small division indicates 10 ^{o}C ÷ 10 divisions = 1 ^{o}C.

(iii) The smallest value this thermometer can accurately read is 1 ^{o}C.

99. Lambok read that the core of the Sun has a temperature of about 15 million degrees Celsius, while absolute zero is – 273.15 ºC. He wonders if these temperatures can be measured by ordinary thermometers.

(i) Can a laboratory thermometer measure the Sun's core temperature? Why or why not? (Evaluating)

(ii) What does absolute zero represent in terms of temperature?

(iii) Which temperature scale has its zero point at absolute zero?

Ans :

(i) No, a laboratory thermometer cannot measure the Sun's core temperature. Its range is extremely limited compared to such high temperatures, and it would vaporize instantly.

(ii) Absolute zero (0 Kelvin or -273.15 ^{o}C) is the lowest possible temperature, where theoretically, all molecular motion ceases.

(iii) The Kelvin scale has its zero point at absolute zero.

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Ans :

(d) 1-B, 2-C, 3-A, 4-D
Washing is crucial for clinical thermometer hygiene. Laboratory thermometers are read while immersed. Correct eye level prevents parallax. Holding by stem prevents breakage/error for lab thermometers.

VERY SHORT QUESTION

45. What is a reliable measure of the hotness or coldness of a body?

Ans :

A reliable measure of hotness or coldness of a body is its temperature.

46. What is the device used to measure temperature called?

Ans :

A device that measures temperature is called a thermometer.

47. Name the two common types of thermometers.

Ans :

Clinical thermometers and laboratory thermometers.

48. What is the primary use of a clinical thermometer?

Ans :

Clinical thermometers are used to measure human body temperatures.

49. What scale is generally used by clinical thermometers for measuring temperature?

Ans :

Clinical thermometers generally use the Celsius scale.

50. What is the unit of temperature on the Celsius scale and its symbol?

Ans :

The unit is degree Celsius, denoted by

51. Why are mercury thermometers being replaced by digital thermometers?

Ans :

Mercury is extremely toxic and difficult to dispose of if the thermometer breaks.

52. What type of thermometers were commonly used during the COVID-19 pandemic to measure temperature from a distance?

Ans :

Non-contact thermometers or infrared thermometers were used.

53. What is considered the normal temperature of a healthy human body in degree Celsius?

Ans :

The normal temperature of a healthy human body is taken to be 37.0 °C.

54. Name one factor that can influence a person's body temperature.

Ans :

Age (or time of the day, activity level).

55. What is the typical lower limit of temperature that human body temperature normally does not go below?

Ans :

The temperature of human beings does not normally go below 35 °C.

56. What is the unit of temperature on the Fahrenheit scale and its symbol?

Ans :

The unit is degree Fahrenheit, denoted by °F.

57. What is the SI unit of temperature?

Ans :

The SI unit of temperature is kelvin.

58. What is the symbol for kelvin?

Ans :

The symbol for kelvin is K.

59. What liquid is commonly used in laboratory thermometers, often coloured red?

Ans :

Alcohol is commonly used (or mercury).

60. What is the typical temperature range of a school laboratory thermometer mentioned in the chapter?

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4. Atmospheric Water Generator (AWG) : Technology that uses condensation to extract drinkable water from humid air.

5. HOW CAN WATER BE EVAPORATED FASTER OR SLOWER?

Factors Affecting Evaporation are as follows :

1. Surface Area : Water evaporates faster when spread over a larger surface area (Activity 8.7 : water in a plate evaporates faster than in a bottle cap).
2. Temperature : Water evaporates faster in sunlight/higher temperatures than in shade/ lower temperatures (Activity 8.8). Clothes dry faster on hot days.
3. Wind/Air Movement : Water evaporates faster on a windy day. Fans help dry clothes faster by increasing air movement.
4. Humidity : Water evaporates slower when the air already contains a lot of water vapour (high humidity). Clothes dry slowly on rainy days.

6. COOLING EFFECT

When water evaporates, it takes heat from the surroundings, causing a cooling effect.
Examples : Water stored in an earthen pot (matka or surahi) stays cool because water seeps through pores and evaporates from the outer surface. Sprinkling water on floors/roofs cools them. Rubbing sanitizer feels cold as it evaporates quickly. Sweating cools the body, especially with wind/fan assistance.

7. HOW DO CLOUDS GIVE US RAIN?

1. Cloud Formation : Water evaporates from oceans and land. This water vapour rises (being lighter than air) and cools at higher altitudes. The cooled water vapour condenses into tiny water droplets, often forming around dust particles. These collections of droplets form clouds.
2. Rain, Hail, Snow : When water droplets in clouds combine and become heavy enough, they fall to Earth as rain. Under specific cold conditions, they may fall as hail or snow.
3. Water Conservation : Emphasizes that only a small fraction of Earth's water is usable freshwater, and its conservation is crucial due to increasing population and demand.

NCERT ACTIVITY

Activity 8.1 : Let us observe

1. Put an ice cube in a cup, leave it on the table and observe.

Question :

(i) What can you conclude from the observations?
(ii) Does this mean that ice and water are the same substance?

Ans :

Observation:

When you leave an ice cube in a cup on the table, it slowly changes into water.

Conclusion:

From this observation, we can conclude that ice and water are indeed the same substance. They are just two different forms, or "states," of the same water. Ice is the solid state of water, and liquid water is the liquid state of water.

Activity 8.2 : Let us investigate

1. Take a tablespoon of water on a steel plate as shown in Figure.

Figure : Steel plate with a tablespoon of water

2. Observe whether water seeps through to the other side of the plate or not.
3. Keep observing this at regular intervals until the water completely disappears.

Question :

(i) What do you infer?
(ii) Is this activity enough to come to the conclusion that water does not seep through a steel plate?

Ans :

Observation: When you put water on a steel plate, you will observe that the water does not go through the plate to the other side. If you leave

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it for some time, the water will slowly disappear completely.

Inference: From this, we can infer that the water did not seep through the steel plate because steel is a solid material and water cannot pass through it. The water disappears because it changes into water vapour (a gas) and mixes with the air. This process is called evaporation.

Sufficiency of activity: Yes, this activity is enough to conclude that water does not seep through a solid steel plate. If it had seeped through, the other side of the plate would have become wet, or the water level in the puddle would decrease due to absorption, which doesn't happen with a steel plate. The disappearance is due to evaporation.

Activity 8.3 : Let us experiment

1. Take cold water in a glass tumbler.
2. Add a few ice cubes into it as shown in Figure.

Figure : A glass tumbler containing cold water and ice cubes

3. Leave it undisturbed for five minutes and observe it.
4. Record your observations and the questions that arise in your mind. You can also touch the outer surface of the glass tumbler to feel if there is any change.

Ans :

Observation:

After a few minutes, you will observe tiny water droplets (like small drops of water) forming on the outer surface of the glass tumbler. When you touch the glass, it will feel wet and cold.

Activity 8.4 : Let us measure

Aavi and Thirav conduct an activity to find evidence for their reasons. You can also conduct the activity by following the steps given below. Record your data in Table.

1. Take a glass tumbler half-filled with water containing a few ice cubes. Cover it with a small steel plate.
2. Observe the reading on the balance and record the weight after every five minutes.
3. Continue observing for 30 minutes. Record your observations in Table.

Table : Measurement of mass in condensation experiment using a digital weighing balance

Time	Mass of water
0 min	
5 min	
10 min	
15 min	
20 min	
25 min	
30 min	

Predict what will happen to the mass of cold water kept on the digital weighing balance. Will it increase or decrease or remain the same?

Ans :

Prediction: The mass of the cold water (and the tumbler/plate) kept on the digital weighing balance will increase.

Time (Min)	Mass of water (in grams)
0 min	250.0 g
5 min	250.2 g
10 min	250.5 g
15 min	250.7 g
20 min	251.0 g
25 min	251.3 g
30 min	251.6 g

Observations and Explanation:

You will observe that the reading on the digital weighing balance slowly but steadily increases over time. This means the total weight of the glass, water, ice and plate becomes slightly heavier.

Activity 8.5 : Let us identify

1. Put an ice cube in one container and transfer it to another container of different shape. What changes do you notice in the shape of the ice cube? Record your observations in Table.
2. Pour water from one container to another container of a different shape. Observe how water behaves compared to the ice cube and make a record. Did you notice how water flows from one container to the other? What happens to its shape?

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3. Pour water on a clean surface and observe how it spreads.
4. When water gets converted into water vapour, how does this water vapour spread? Compare this with the spreading behaviour of water.

Table : Compare different states of water

Property	**Ice (Solid state)**	**Water (Liquid state)**	**Water vapour (Gaseous state)**
Shape			
Ability to flow			
Ability to spread			

Ans :

Property	**Ice (Solid state)**	**Water (Liquid state)**	**Water vapour (Gaseous state)**
Shape	Has a fixed shape	Takes the shape of the container	Has no fixed shape , takes shape of container, spreads to fill space
Ability to flow	Does not flow	Flows	Flows / Spreads easily
Ability to spread	Does not spread	Spreads	Spreads throughout the available space

Activity 8.6 : Let us complete the diagram

Fill up the blank boxes in Figure marked as A, B, C and 1, 2, 3, 4 for conversion of different states of water using the words given in the box. Two words have been filled for you.

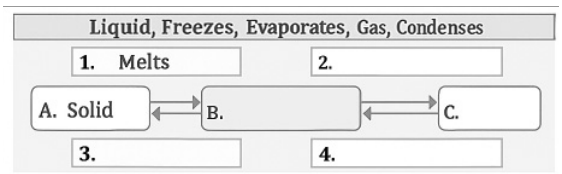

Figure : Conversion of different states of water

Ans :

A. Solid: Represents ice.
B. Liquid: Represents water.
C. Gas: Represents water vapour.
   1. Melts: The process of a solid changing to a liquid (e.g., ice to water).
   2. Evaporates: The process of a liquid changing to a gas (e.g., water to water vapour).
   3. Freezes: The process of a liquid changing to a solid (e.g., water to ice).
   4. Condenses: The process of a gas changing to a liquid (e.g., water vapour to water droplets).

Activity 8.7 : Let us investigate

1. Take water in a small cap of a bottle (you may use sanitiser in place of water).
2. Take the same amount of water in a plate. The exposed area of water in the bottle cap and the plate are different.
3. Keep both of them near each other.
4. Record the time taken for the water to completely evaporate in each case in Table.

Table : Findings of the investigation

Exposed area of water	**Time taken for complete evaporation**
Less (bottle cap)	
More (plate)	

(i) What conditions did we keep the same?
(ii) What did we change in this investigation?
(iii) What did we measure?

Ans :

Observations and Analysis:
Time taken for complete evaporation: The water in the plate will evaporate much faster than the water in the bottle cap.
Conditions kept the same:
(i) The amount of water.
(ii) The type of liquid (water).
(iii) The surrounding temperature (since they are kept near each other).
(iv) The air movement (assuming no fan is used near them).
Conditions changed in this investigation: The exposed surface area of the water. The water in the plate has a larger surface area exposed to the air compared to the water in the bottle cap.
What we measured: The time taken for the water to completely evaporate in each case.

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6. Why do water droplets appear on the outer surface of a glass tumbler containing cold water and ice cubes (Activity 8.3)?
(A) Water from inside the tumbler seeps through the glass.
(B) Ice from inside melts and leaks out of the glass.
(C) Water vapour from the surrounding air condenses on the cold outer surface.
(D) The glass itself produces water when it becomes cold.

Ans :

(C) Water vapour from the surrounding air condenses on the cold outer surface.
The cold outer surface of the glass tumbler cools the surrounding air. Water vapour present in this air, upon contacting the cold surface, loses heat and changes from a gas to liquid water droplets.

7. What is condensation?
(A) The process of conversion of water into its vapour state.
(B) The process of conversion of water vapour into its liquid state.
(C) The process of ice melting into liquid water.
(D) The process of water freezing into ice.

Ans :

(B) The process of conversion of water vapour into its liquid state.
Condensation is the physical process where a substance in its gaseous state, like water vapour, transforms into its liquid state, such as water droplets, typically due to cooling.

8. When a covered glass tumbler with ice water is weighed over time, what happens to its mass, and why?
(A) Mass decreases due to evaporation from inside.
(B) Mass remains exactly the same.
(C) Mass increases due to condensation of water vapour from the air onto the outer surface.
(D) Mass fluctuates randomly due to temperature changes.

Ans :

(C) Mass increases due to condensation of water vapour from the air onto the outer surface.
As water vapour from the surrounding air condenses into liquid water droplets on the cold outer surface of the tumbler, this added water contributes to an increase in the overall mass measured by the balance.

9. How does ice (solid state of water) differ from liquid water in terms of shape?
(A) Ice takes the shape of its container; liquid water has a fixed shape.
(B) Ice has a fixed shape; liquid water takes the shape of its container.
(C) Both ice and liquid water have a fixed shape.
(D) Neither ice nor liquid water has a fixed shape.

Ans :

(B) Ice has a fixed shape; liquid water takes the shape of its container.
Solids like ice maintain their own definite shape regardless of the container. Liquids like water do not have a fixed shape and will conform to the shape of the container they are in.

10. How does water vapour (gaseous state) differ from liquid water in terms of spreading and shape?
(A) Water vapour has a fixed shape; liquid water spreads to fill available space.
(B) Water vapour spreads to fill entire available space and has no fixed shape; liquid water takes container shape but has fixed volume.
(C) Both spread to fill entire available space and have no fixed shape.
(D) Liquid water has a fixed shape; water vapour takes the shape of its container.

Ans :

(B) Water vapour spreads to fill entire available space and has no fixed shape; liquid water takes container shape but has fixed volume.
Gases like water vapour expand to occupy the entire volume of their container and do not have a definite shape. Liquids take the container's shape but maintain a constant volume.

11. What is the process of conversion of a solid into its liquid state called?
(A) Freezing
(B) Evaporation
(C) Condensation
(D) Melting

Ans :

(D) Melting
Melting is the phase transition process where a substance changes from its solid state to its liquid state, typically upon absorbing heat energy.

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Conditions affecting freshness:
Zutside temperature: On hotter days, more evaporation happens, so it might stay cooler but also need more frequent watering.
Humidity: In dry weather, evaporation is faster, leading to more cooling. In humid weather, evaporation is slower, so the cooling effect might be less.
Regular watering: Keeping the sand moist is crucial for continuous evaporation and cooling.
Ventilation: Good airflow around the cooler helps evaporation.
What else can be used in place of sand for better cooling:
Materials that can hold water and allow it to evaporate slowly would work. Spongy materials or even porous soil could be considered, but sand is commonly used because it holds water well and allows for effective evaporation.

Activity 8.10 : Let us engage in a group activity

1. Take an empty discarded one litre plastic bottle. Pour about one cup of water into it.
2. Close the lid tightly. Now quickly squeeze and release the bottle continuously for about 2-3 minutes. Observe the space above the water in the bottle.
3. Repeat the same activity after adding a small burnt piece of newspaper into the water.
4. What will you observe?

Ans :

Observation (First part - only water):
When you squeeze and release the bottle with just water, you might not see much, or maybe a very faint mist, depending on the air's humidity.
Observation (Second part - with burnt newspaper): When you add a small burnt piece of newspaper and repeat squeezing and releasing, you will observe a noticeable haziness or a cloud-like formation above the water in the bottle.
Explanation:
The burnt newspaper provides very tiny, invisible dust particles in the bottle. When you squeeze the bottle, the air inside gets compressed and heated slightly. When you release it quickly, the air expands and cools down rapidly. This rapid cooling makes the water vapour (gas) in the air inside the bottle condense (change back to liquid water) around these tiny dust particles, forming many tiny water droplets that appear as a cloud. This activity shows that dust particles act as tiny surfaces for water vapour to condense on, which is important for cloud formation in nature.

Activity 8.11 : Let us understand the process

Label figure using arrows shown and the words given in the box to show where water is stored, how water changes its state and where it moves.
Words to use: Cloud, Lake, Ocean, River, Groundwater, Evaporation, Condensation, Rain, Snow

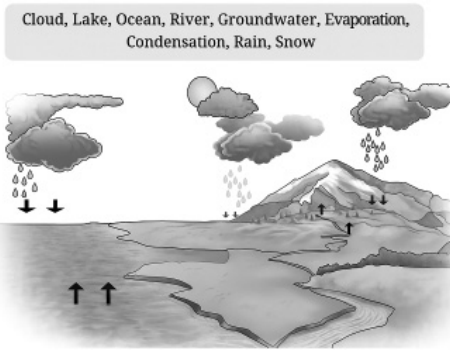

Figure : Change of states and movement of water

Ans :

1. Ocean / Lake / River : These are places where water is stored on the Earth's surface. Arrows pointing upwards from these bodies indicate evaporation.
2. Evaporation: Arrows pointing upwards from the ocean, lakes, rivers, or land represent water changing from liquid to gas (water vapour) due to heat from the sun and rising into the atmosphere.
3. Cloud: The masses of water droplets and ice crystals floating in the atmosphere. Water vapour rises and condenses to form clouds.
4. Condensation: The process represented by clouds forming in the sky, where water vapour cools and turns into tiny water droplets or ice crystals.
5. Rain/Snow: Arrows pointing downwards from the clouds represent water falling back to Earth as precipitation. Rain is liquid water, and snow is solid water.
6. Groundwater: Water that seeps into the ground after rain or melting snow. (This would be an arrow pointing down from the surface into the ground).
7. River: Represents water flowing back into larger bodies of water, completing the cycle.

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32. To make a pot-in-pot cooler work effectively for keeping vegetables fresh, as described in Activity 8.9, what needs to be done regularly to the sand between the pots?
(A) The sand needs to be replaced with fresh soil daily.
(B) The sand needs to be kept moist by adding water.
(C) The sand should be heated to keep the inner pot warm.
(D) The sand should be covered with a plastic sheet.

Ans :

(B) The sand needs to be kept moist by adding water.
The cooling effect of the pot-in-pot cooler relies on the evaporation of water from the moist sand. Therefore, water must be added regularly to the sand to maintain moisture for continuous evaporation and cooling.

33. **Assertion (A) :** Water vapour is lighter than air, causing it to rise in the atmosphere.
Reason (R) : Clouds are formed when this rising water vapour cools and condenses at certain heights.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Water vapour being lighter than the surrounding air causes it to ascend. As it rises to higher altitudes where temperatures are lower, it cools down and undergoes condensation, forming tiny water droplets or ice crystals that constitute clouds.

34. Which of the following conditions generally promote faster evaporation?
1. Low humidity
2. High temperature
3. Still air (no wind)
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(A) 1 and 2 only
Low humidity allows more water to enter the air. High temperature provides more energy for water molecules to escape. Wind (not still air) helps by removing moist air from above the water surface.

35. On a cold winter morning, you see your breath as a cloud when you exhale.
This visible cloud is formed due to:
(A) Evaporation of water from your mouth.
(B) Condensation of water vapour from your warm breath in the cold air.
(C) Freezing of air particles.
(D) Smoke particles present in your breath.

Ans :

(B) Condensation of water vapour from your warm breath in the cold air.
Your warm, moist breath contains water vapour. When this exhaled air mixes with the cold winter air, the water vapour cools rapidly and condenses into tiny visible water droplets or ice crystals, forming the cloud you see.

36. The Thirukkural quote at the beginning implies that :
(A) Oceans will dry up if it gets too hot.
(B) Rain is essential even for the mighty ocean to maintain its level.
(C) Ocean water is the primary source of all rainfall.
(D) It is impossible for the ocean to ever be drained.

Ans :

(B) Rain is essential even for the mighty ocean to maintain its level.
The quote If it does not rain well, even the mighty ocean will be drained suggests the importance of rainfall in replenishing water bodies, including the vast ocean, implying a connection within the water cycle.

37. Why does rubbing hand sanitizer on your hands make them feel cool?
(A) The sanitizer chemically reacts with skin to produce cold.
(B) The sanitizer is stored at a very low temperature.
(C) The alcohol in the sanitizer evaporates quickly, taking heat from your hands.
(D) The sanitizer absorbs water from the skin, causing a cooling sensation.

Ans :

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9. Reflect on the statement Water is our responsibility before it is our right. Share your thoughts.

Ans :

The statement means we must take care of water before using it freely. Water is precious, and wasting or polluting it can harm everyone. By using it wisely and keeping it clean, we protect it for ourselves and future generations..

10. The seat of a two-wheeler parked on a sunny day has become very hot. How can you cool it down?

Ans :.

To cool down the hot seat of a two-wheeler parked in the sun, you can:

1. Cover it with a cloth soaked in water – evaporation will cool the seat.
2. Pour a little water on the seat – as the water evaporates, it takes away heat.
3. Move it into the shade or wait for it to cool naturally.

This works because of evaporation, which takes heat from the surface and cools it down.

MULTIPLE CHOICE QUESTION

1. What are the two forms of the same substance, like ice and water, also called?
(A) Mixtures
(B) Solutions
(C) States
(D) Compounds

Ans :

(C) States
Ice and water are different forms or states of the same substance. These states (solid and liquid in this case) exhibit different physical properties and behaviors.

2. What happens to an ice cube when it is left on a table at room temperature, as observed in Activity 8.1?
(A) It evaporates directly into gas.
(B) It gets converted into water.
(C) It remains unchanged indefinitely.
(D) It becomes smaller but stays solid.

Ans :

(B) It gets converted into water.
Activity 8.1 demonstrates that when an ice cube (solid state of water) is left at room temperature, it absorbs heat from the surroundings and melts, changing into liquid water.

3. When water in puddles disappears after some time, where does the water primarily go?
(A) It seeps entirely into the ground.
(B) It gets converted into water vapour and goes into the air.
(C) It freezes and becomes invisible ice.
(D) It is absorbed by nearby plants completely.

Ans :

(B) It gets converted into water vapour and goes into the air.
The disappearance of water from puddles or wet surfaces is primarily due to evaporation, where liquid water changes into its gaseous state (water vapour) and mixes with the air.

4. What is evaporation?
(A) The process of conversion of water vapour into its liquid state.
(B) The process of conversion of water into its solid state (ice).
(C) The process of conversion of water into its vapour state.
(D) The process of water seeping into the ground.

Ans :

(C) The process of conversion of water into its vapour state.
Evaporation is defined as the process where a liquid, such as water, changes into its gaseous state, which is called vapour (e.g., water vapour or steam).

5. What is steam actually composed of ?
(A) Purely invisible water vapour.
(B) Water vapour, with some part converting into tiny visible water droplets.
(C) A different chemical substance than water.
(D) Only hot air mixed with smoke.

Ans :

(B) Water vapour, with some part converting into tiny visible water droplets.
Steam is essentially water vapour and its visibility is usually the result of some of that vapour condensing into tiny liquid water droplets suspended in the air.

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Ans :

(C) The circulation of water between the Earth's surface and the atmosphere.
The water cycle describes the continuous movement of water on, above, and below the surface of the Earth, involving processes like evaporation, condensation, precipitation, and runoff.

19. Which of these is NOT a commonly observed state of water in daily life?
(A) Solid (ice)
(B) Liquid (water)
(C) Gas (water vapour/steam)
(D) Plasma

Ans :

(D) Plasma
Water commonly exists in three states in daily life: solid (ice), liquid (water) and gas (water vapour or steam). While plasma is another state of matter, it is not typically observed with water in everyday situations.

20. What is a key difference between evaporation and condensation?
(A) Evaporation is liquid to gas; condensation is gas to liquid.
(B) Evaporation is gas to liquid; condensation is liquid to gas.
(C) Evaporation requires cooling; condensation requires heating.
(D) Both are processes of solid changing to liquid.

Ans :

(A) Evaporation is liquid to gas; condensation is gas to liquid.
Evaporation is the phase change from liquid to gas (e.g., water to water vapour). Condensation is the opposite phase change, from gas to liquid (e.g., water vapour to water droplets).

21. Which of these factors generally SLOWS DOWN the rate of evaporation?
(A) Increased temperature
(B) Increased wind speed
(C) Increased surface area of water
(D) Increased humidity

Ans :

(D) Increased humidity
High humidity means the air is already holding a lot of water vapour. This makes it harder for more water to evaporate into the air, thus slowing down the evaporation rate.

22. If you want to dry your wet clothes quickly on a day that is not sunny, what could you do to speed up the process, based on the principles of evaporation?
(A) Keep the clothes bundled up tightly.
(B) Place them in a still, closed room.
(C) Use a fan to increase air movement over the clothes.
(D) Sprinkle more water on them.

Ans :

(C) Use a fan to increase air movement over the clothes.
Increasing air movement (wind) helps to carry away the water vapour forming near the surface of the wet clothes, allowing more water to evaporate more quickly.

23. **Assertion (A) :** Ice floats on water.
Reason (R) : Ice is the solid state of water and all solids are denser than their liquids.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(C) A is true, but R is false.
Ice indeed floats on water. However, the reason is that ice (solid water) is less dense than liquid water, which is an unusual property. Most substances are denser in their solid state than in their liquid state.

24. Consider the following processes involving water:
1. Water turning into ice in a freezer.
2. Water droplets forming on a cold glass.
3. Puddles drying up on a sunny day.

Which of these involve a change from liquid to gas?
(A) 1 only
(B) 3 only
(C) 1 and 2 only
(D) 2 and 3 only

Ans :

(B) 3 only
1. Water to ice is freezing (liquid to solid).
2. Water droplets forming on a cold glass is condensation (gas to liquid).
3. Puddles drying up is evaporation (liquid to gas).

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12. Besides water turning into ice, what is another example of a substance changing from liquid to solid (freezing)?
(A) Liquid wax changing to solid wax upon cooling.
(B) Salt dissolving in water.
(C) Sugar caramelizing upon heating.
(D) Iron rusting in the presence of moisture.

Ans :

(A) Liquid wax changing to solid wax upon cooling.
Candle wax is an example of a substance that undergoes freezing or solidification—when molten wax cools down, it turns back into a solid form..

13. Which condition generally makes water evaporate faster?
(A) Keeping the water in a narrow-mouthed bottle.
(B) Spreading the water out on a plate (larger exposed surface area).
(C) Keeping the water in a cool, shaded place.
(D) High humidity in the surrounding air.

Ans :

(B) Spreading the water out on a plate (larger exposed surface area).
A larger surface area exposed to the air allows more water molecules to escape into the vapour phase simultaneously, thus increasing the rate of evaporation.

14. On a hot sunny day, clothes dry faster than on a cloudy day. This is primarily because:
(A) Sunlight makes the clothes heavier.
(B) Higher temperature increases the rate of evaporation.
(C) Sunlight chemically changes the water into gas.
(D) Clouds prevent air movement.

Ans :

(B) Higher temperature increases the rate of evaporation.
Increased temperature provides more energy to the water molecules in the wet clothes, causing them to transition into water vapour more rapidly, hence speeding up the drying process.

15. What is humidity?
(A) The speed of the wind.
(B) The temperature of the air.
(C) The amount of water vapour present in the air.
(D) The pressure exerted by the air.

Ans :

(C) The amount of water vapour present in the air.
Humidity is a measure of the quantity of water vapour contained in the atmosphere or a given volume of air. Higher humidity means more moisture in the air.

16. Why does water in an earthen pot (matka) often feel colder than water in a stainless steel pot?
(A) The clay of the earthen pot actively cools the water chemically.
(B) Water seeps through the pores of the earthen pot and evaporates, causing a cooling effect.
(C) Stainless steel heats up the water it contains.
(D) Earthen pots are always kept in colder locations.

Ans :

(B) Water seeps through the pores of the earthen pot and evaporates, causing a cooling effect.
Earthen pots are porous. Water seeps to the outer surface and evaporates. This evaporation process requires heat, which is drawn from the pot and the water inside, leading to cooling.

17. How do dust particles in the atmosphere contribute to the formation of clouds?
(A) Dust particles directly convert into water droplets.
(B) Dust particles provide surfaces for water vapour to condense upon.
(C) Dust particles absorb sunlight, heating the air and forming clouds.
(D) Dust particles repel water vapour, forcing it to accumulate.

Ans :

(B) Dust particles provide surfaces for water vapour to condense upon.
Water vapour in the air needs a surface to condense into liquid droplets. Tiny dust particles (and other aerosols) act as condensation nuclei, around which water vapour can gather and form cloud droplets.

18. What is the water cycle?
(A) The process of purifying water for drinking.
(B) The seasonal flooding of rivers.
(C) The circulation of water between the Earth's surface and the atmosphere.
(D) The storage of water in underground reservoirs.

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Conclusion: Water evaporates faster when it has a larger surface area exposed to the air.

Activity 8.8: Let us explore

1. Take identical caps of two bottles.
2. Pour equal amount of water in each of the cap.
3. Place one of the cap in sunlight and keep the other in shade as shown in Figure.

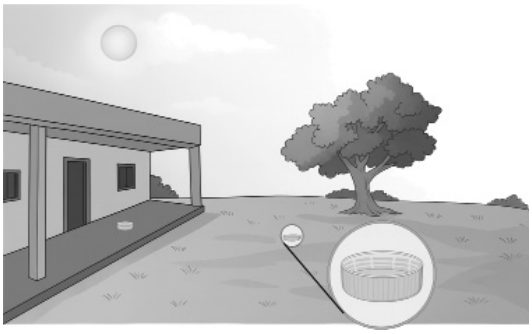

Figure : Evaporation of water in sunlight and in shade

4. Observe the two caps of bottles after every 15 minutes.
5. Record the time taken for the water to completely evaporate in each case.
6. You can also repeat this activity on a windy or a rainy day, and record your observations.

Ans :

Observations and Conclusions:

Sunlight vs. Shade: The water in the cap kept in direct sunlight will evaporate much faster than the water in the cap kept in the shade. This shows that temperature (heat from sunlight) affects the rate of evaporation. Higher temperature leads to faster evaporation.

Windy Day: If you repeat this on a windy day, the water will evaporate even faster. This shows that air movement (wind) also speeds up evaporation.

Rainy Day: If you repeat this on a rainy day (which usually means more humidity in the air), the water will evaporate slower. This indicates that humidity (amount of water vapour already in the air) affects evaporation. Higher humidity leads to slower evaporation.

Overall Conclusion: Evaporation is faster when there is more heat, more air movement (wind), and less humidity in the air.

Activity 8.9 : Let us make a model

1. Take two earthen pots of different sizes.
2. Fill the bottom of the larger pot with a layer of sand.
3. Place the smaller pot into the centre of the larger one as shown in Figure.

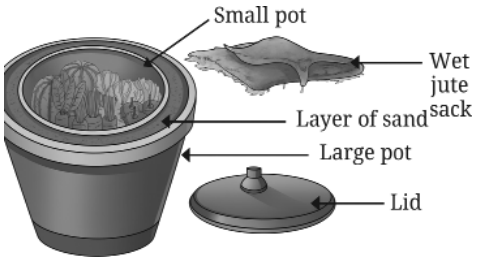

Figure : A pot-in-pot cooler

4. Fill the gap between the pots with more sand.
5. Pour water in the sand area.
6. Place a lid or wet jute sack to cover the top of the smaller pot.
7. You can also make a drawing of the pot-in-pot cooler once it is ready

Allow 4-5 hours for the mini pot-in-pot cooler to cool down. Observe and discuss how it creates a cooling effect inside the pots. Keep some vegetables and fruits in it and observe for a week on a daily basis to check for the freshness of the vegetables and fruits kept inside the cooler. You will have to add water regularly to keep the sand moist. For how many days can the vegetables and fruits be kept fresh in it? What are the conditions which can affect the number of these days? What else can be used in place of sand for better cooling?

Ans :

How it creates a cooling effect:

The water you pour in the sand between the two pots seeps through the tiny pores of the earthen pots and the sand. This water then slowly evaporates from the surface of the pots and the wet sand. When water evaporates, it takes heat from its surroundings, which includes the pots and the air inside the inner pot. This removal of heat makes the inside of the cooler (and anything stored in it) feel cold. This is known as the cooling effect of evaporation.

Freshness of vegetables and fruits:

The vegetables and fruits kept inside the pot-in-pot cooler will stay fresh for a longer time compared to keeping them outside at room temperature. The exact number of days will depend on factors like the type of vegetable/fruit, the outside temperature, and how often you add water.

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25. Aavi and Thirav are making lemonade on a hot day. They add ice cubes to a glass of lemonade. After a few minutes, they notice the outside of the glass is wet.
This wetness is most likely due to:
(A) Lemonade seeping through tiny cracks in the glass.
(B) The ice melting so fast that it splashes out.
(C) Condensation of water vapour from the humid air onto the cold glass surface.
(D) The glass sweating because it is working hard to keep the lemonade cold.

Ans :

(C) Condensation of water vapour from the humid air onto the cold glass surface.
The cold surface of the glass, due to the ice and cold lemonade, cools the surrounding humid air. This causes the water vapour in the air to change into liquid water droplets on the glass, a process known as condensation.

26. What is the term for the state of water when it is invisible and present in the air around us, even at room temperature?
(A) Ice crystals
(B) Liquid dew
(C) Water vapour
(D) Pressurized steam

Ans :

(C) Water vapour
Water vapour is the gaseous state of water. It is present in the air around us, even when not visible, and is a key component of humidity.

27. When water is boiled in a kettle and steam comes out, if you hold a cool plate above the steam, water droplets form on the plate. This demonstrates:
(A) Evaporation from the plate.
(B) Condensation of steam.
(C) Freezing of steam.
(D) Melting of the plate.

Ans :

(B) Condensation of steam.
The hot steam (water vapour) comes into contact with the cooler surface of the plate, loses heat, and changes its state from gas back to liquid water droplets, which is condensation.

28. The process by which liquid water changes into solid ice is called:
(A) Melting (B) Evaporation
(C) Condensation (D) Freezing

Ans :

(D) Freezing
Freezing, or solidification, is the phase transition where a liquid turns into a solid when its temperature is lowered below its freezing point.

29. Which of these factors, when increased, typically leads to a slower rate of evaporation?
(A) Temperature of the water
(B) Surface area of the water
(C) Speed of wind blowing over the water
(D) Humidity of the surrounding air

Ans :

(D) Humidity of the surrounding air
Higher humidity means the air is already saturated or nearly saturated with water vapour. This makes it more difficult for additional water to evaporate into the air, thereby slowing down the evaporation process.

30. How do the properties of shape and ability to flow compare between solid ice and liquid water?
(A) Ice has a fixed shape and flows; water takes container's shape and does not flow.
(B) Ice has a fixed shape and does not flow; water takes container's shape and flows.
(C) Both have fixed shapes and flow easily.
(D) Neither has a fixed shape, but only water flows.

Ans :

(B) Ice has a fixed shape and does not flow; water takes container's shape and flows.
Solid ice maintains its own definite shape and does not flow. Liquid water, characteristic of fluids, takes the shape of its container and can flow readily.

31. All of the following are examples of evaporation in daily life EXCEPT:
(A) Drying of wet clothes.
(B) Disappearance of water from mopped floors.
(C) Formation of dew drops on grass in the morning.
(D) Sweat drying from our body.

Ans :

(C) Formation of dew drops on grass in the morning.
Drying clothes, mopped floors, and sweat involve liquid water turning into vapour (evaporation). Dew formation is an example of condensation, where water vapour from the air turns into liquid droplets on cool surfaces.

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NCERT EXERCISE

1. Which of the following best describes condensation?
   (i) The conversion of water into its vapour state.
   (ii) The process of water changing from a liquid into gaseous state.
   (iii) The formation of clouds from tiny water droplets.
   (iv) The conversion of water vapour into its liquid state.

   Ans :

   (iv) The conversion of water vapour into its liquid state.
   Condensation always means water vapour cooling and turning back into tiny liquid droplets (e.g., dew on a cold bottle or cloud droplets).

2. Identify in which of the given processes, evaporation is very important—
   (i) Colouring with
      (a) crayons
      (b) water colours
      (c) acrylic colours
      (d) pencil colours
   (ii) Writing on paper with
      (a) pencil
      (b) ink pen]
      (c) ball point pen

   Ans :

   (i) (b) water colours
   (ii) (b) ink pen
   Water-colour paint and ink-pen ink dry only when their liquid solvent (mostly water) evaporates; crayons, pencils or ball-pens rely mainly on wax or quick-dry gels, so evaporation is less critical.

3. We see green coloured plastic grass at many places these days. Space around natural grass feels cooler than space around the plastic grass. Can you find out why?

   Ans :

   Natural grass contains water that keeps escaping as vapour (transpiration). Evaporation absorbs heat from the surroundings, so the air above real grass feels cooler. Plastic grass has no water to evaporate, so no cooling occurs.

4. Give examples of liquids other than water that evaporate.

   Ans :

   Alcohol (spirit), petrol, perfume, acetone (nail-polish remover).

5. Fans move air around, creating a cooling sensation. It might seem strange to use a fan to dry wet clothes since fans usually make things cooler, not warmer. Normally, when water evaporates, it requires heat, not cold air. What do you think about this?

   Ans :

   A fan replaces the moist air next to wet cloth with drier air, so water keeps evaporating. Evaporation needs heat, which it takes from the cloth and room; the clothes dry faster even without warm air.

6. Usually, when sludge is removed from drains, it is left in heaps next to the drain for 3–4 days. Afterward, it is transported to a garden or a field where it can be used as manure. This approach reduces transportation cost of the sludge and enhances the safety of individuals handling it. Reflect upon it and explain how.

   Ans :

   When sludge is left near the drain for 3–4 days, it loses water and becomes lighter, so it's cheaper to transport. In this time, harmful germs reduce, and the bad smell becomes less. This makes it safer and easier for people to handle and better to use as manure in fields or gardens.

7. Observe the activities in your house for a day. Identify the activities that involve evaporation. How does understanding the process of evaporation help us in our daily activities?

   Ans :

   At home, I saw evaporation in activities like drying clothes, water drying after mopping, and sweat drying from our skin. Knowing about evaporation helps us dry things faster using heat and air and understand how sweating cools our body.

8. How is water present in the solid state in nature?

   Ans :

   Water is present in the solid state in nature as ice. We can see it as snow on mountains, glaciers in polar regions, icebergs floating in the sea and hail during storms. These are all natural forms of solid water.

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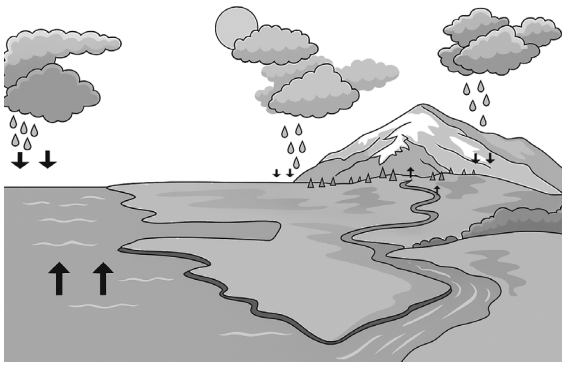
(C) The alcohol in the sanitizer evaporates quickly, taking heat from your hands.
Hand sanitizer often contain alcohol, which evaporates rapidly at room temperature. This evaporation process requires heat energy, which it draws from the surface of your hands, resulting in a cooling sensation.

38. The conversion of water from its liquid state to its gaseous state below its boiling point is specifically termed:
(A) Boiling
(B) Evaporation
(C) Sublimation
(D) Condensation

Ans :

(B) Evaporation
Evaporation is the process where a liquid turns into a gas at any temperature below its boiling point, occurring at the surface of the liquid. Boiling is a specific type of rapid vaporization that occurs throughout the liquid at its boiling point.

39. In the diagram illustrating the water cycle (Figure), what process is shown occurring from oceans, lakes, and rivers, leading to the formation of water vapour in the atmosphere?



(A) Condensation
(B) Precipitation
(C) Evaporation
(D) Infiltration

Ans :

(C) Evaporation
The diagram of the water cycle would depict water from surface bodies like oceans, lakes, and rivers turning into water vapour and rising into the atmosphere. This process is evaporation.

40. How do the three states of water-ice, liquid water, and water vapour-differ in terms of their ability to flow?
(A) Only ice can flow.
(B) Only liquid water can flow.
(C) Both liquid water and water vapour can flow; ice cannot.
(D) All three states can flow equally well.

Ans :

(C) Both liquid water and water vapour can flow; ice cannot.
Liquids (like water) and gases (like water vapour) are fluids, meaning they can flow and take the shape of their container. Solids (like ice) have a fixed shape and do not flow in the same manner.

MATCHING TYPE QUESTION

41. Match the observation or phenomenon in Column A with its scientific explanation in Column B:

	Column A		**Column B**
1.	Feeling water as both cool and warm simultaneously	A.	Mercury is a toxic substance
2.	Digital thermometers replacing mercury ones	B.	Temperature of a substance remains constant during phase change
3.	Boiling water temperature remaining constant	C.	Range of clinical thermometer is limited to body temperatures
4.	Cannot use clinical thermometer for boiling water	D.	Sense of touch is unreliable for judging temperature

(a) 1-D, 2-A, 3-B, 4-C
(b) 1-A, 2-D, 3-C, 4-B
(c) 1-D, 2-C, 3-A, 4-B
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(a) 1-D, 2-A, 3-B, 4-C
Our sense of touch can be misleading about temperature. Digital thermometers are safer than mercury ones. Temperature is constant during

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63. Name one condition that affects how fast water evaporates.

Ans :

Exposed surface area (or sunlight, wind, humidity).

64. What effect does evaporation have on the surrounding temperature?

Ans :

Evaporation causes a cooling effect.

65. What is the circulation of water between the Earth's surface and atmosphere known as?

Ans :

The circulation of water is known as the water cycle.

SHORT ANSWER QUESTION

66. Are ice and water different substances or different states of the same substance? Explain briefly.

Ans :

Ice and water are different states of the same substance. Ice is the solid state, and water is the liquid state.

67. Why does water sprinkled on a hot pan disappear quickly? Name the process involved.

Ans :

Water sprinkled on a hot pan disappears quickly because it gets converted into steam (water vapour). The process involved is evaporation.

68. What makes steam visible if water vapour itself is invisible?

Ans :

Steam is visible due to the presence of tiny droplets of water that form when some of the water vapour condenses.

69. How do dew drops form on plants, especially in the morning?

Ans :

Dew drops form when water vapour present in the air comes in contact with the cool surfaces of plant leaves and condenses into liquid water.

70. Describe one property of water in its solid state (ice) regarding its shape.

Ans :

Ice (solid state) retains its shape irrespective of the container in which it is placed; it has a fixed shape.

71. Describe one property of water in its liquid state regarding its shape and volume.

Ans :

Water (liquid state) takes the shape of the container it is in, so it has no fixed shape, but its volume remains constant.

72. Describe one property of water in its gaseous state (water vapour) regarding its shape and spreading.

Ans :

Water vapour (gaseous state) has no fixed shape and exhibits the property of spreading out to fill the entire available space.

73. How can the state of water be changed from solid (ice) to liquid, and then from liquid to gas (water vapour)?

Ans :

By supplying heat, ice (solid) melts into water (liquid). On further heating, water (liquid) evaporates or boils into water vapour (gas).

74. How can the state of water be changed from liquid to solid (ice)? Name this process.

Ans :

Water can be changed to ice by placing it in a cold environment, like a freezer. This process is called freezing.

75. Explain how increasing the exposed surface area affects the rate of evaporation of water.

Ans :

If water is spread out on a larger surface area, more water molecules are exposed to the air, leading to faster evaporation.

76. How does sunlight affect the rate of evaporation compared to shade?

Ans :

Water evaporates faster when exposed to sunlight compared to when it is kept in the shade because sunlight provides more heat energy.

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(a) 1–C, 2–D, 3–A, 4–B
(b) 1–D, 2–B, 3–C, 4–A
(c) 1–A, 2–C, 3–B, 4–D
(d) 1–B, 2–A, 3–D, 4–C

Ans :

(b) 1–D, 2–B, 3–C, 4–A
A larger surface area increases evaporation. Higher temperature gives particles more energy to evaporate. Strong wind removes vapor quickly, speeding up evaporation. High humidity slows evaporation as the air is already moist. Hence, option (b) is correct.

VERY SHORT QUESTION

46. What are the different forms of the same substance, like ice and water, called?

Ans :

These different forms are also called states.

47. What is the gaseous state of water called?

Ans :

The gaseous state of water is called water vapour.

48. What is the process of conversion of water into its vapour state called?

Ans :

The process is called evaporation.

49. Is water vapour visible or invisible?

Ans :

Water vapour itself is actually invisible.

50. Give one example of evaporation from daily life.

Ans :

Drying of wet clothes (or mopped floor, sweat).

51. What happens to hand sanitizer when you rub it on your hands?

Ans :

Hand sanitizer evaporates from your hands.

52. What are the tiny drops of water appearing on the outer surface of a cold glass tumbler called?

Ans :

They are called water droplets.

53. What is the process of conversion of water vapour into its liquid state called?

Ans :

The process is called condensation.

54. What is the amount of water vapour in the air also known as?

Ans :

The amount of water vapour in the air is also known as humidity.

55. Name the solid state of water.

Ans :

The solid state of water is ice.

56. Does ice flow like water?

Ans :

No, ice does not flow like water.

57. Does water (liquid state) have a fixed shape?

Ans :

No, water (liquid state) does not have a fixed shape; it takes the shape of the container.

58. Do gases like water vapour possess a fixed shape?

Ans :

No, gases do not possess a fixed shape and spread out in the entire available space.

59. Name a substance other than water that can exist in solid, liquid and gaseous states.

Ans :

Wax (or oil, ghee).

60. What must be supplied to ice to change it into water?

Ans :

Heat must be supplied to ice to change it into water.

61. What is the process of conversion of a solid into its liquid state called?

Ans :

The process is called melting.

62. What is the process of conversion of a liquid into its solid state called?

Ans :

The process is called freezing.

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Figure : Magnetic separation

NCERT ACTIVITY

Activity 9.1 : Let us explore

1. Take a handful of roasted peanuts and rub them between your palms. What happens?
2. Is it possible to separate the removed skin and the peanuts?
3. Now, try blowing it.

Question :

(i) What do you observe?

(ii) Which of these components—removed peanut skins or peanuts are blown away?

Ans :

(i) When you blow gently over the mixture, the light, papery peanut skins lift into the air and scatter, while the heavier kernels stay where they are.

(ii) Only the removed peanut skins are blown away; the peanuts themselves remain.

Activity 9.2 : Let us observe and create

1. Take a bowl or any container and fill it half with water.
2. Add 2–3 teaspoons of salt into it and stir till the salt dissolves to form a solution.
3. Take a small piece of black or dark coloured thick paper and spread a few drops of the salt solution on it Figure (a).
4. You can also create any art of your choice with this salt solution.
5. Allow it to dry and then observe it (Figure (b) and Figure (c)).

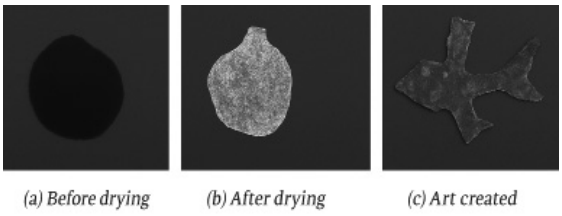

Figure : A few drops of salt solution spread on thick black paper

Question :

(i) Do you observe some patches on the paper?

(ii) What do you think is left on the paper?

(iii) Where has the water disappeared?

Ans :

(i) Yes, after the solution dries, white or crystalline patches are observed on the dark paper where the drops of salt solution were placed (as shown in Figure (b) and (c)).

(ii) The salt that was dissolved in the water is left on the paper. You can feel its presence.

(iii) The water has evaporated. It changed from a liquid state to a gaseous state (water vapor) and mixed with the surrounding air. This is why only the salt remains behind.

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Activity 9.3 : Let us investigate

This activity may be demonstrated by the teacher.

1. Take some salt solution (prepared in Activity 9.2) in a china dish. If a china dish is not available, another suitable vessel may be used.
2. Heat and let the water boil away as shown in Figure.

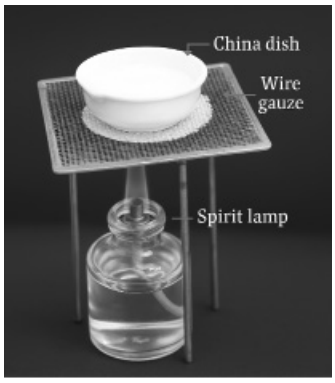

Figure : Heating of china dish containing salt solution

3. Allow the china dish to cool down.

Question :

(i) What do you observe? What is left in the china dish?

77. How does wind affect the rate of drying of clothes? Explain briefly.

Ans :

Clothes dry faster on a windy day because the wind carries away the water vapour from near the clothes, allowing more water to evaporate.

78. Why do clothes dry slowly on a rainy day?

Ans :

On a rainy day, the air is already high in humidity (water vapour). This slows down the rate of evaporation from clothes.

79. Explain the cooling effect observed when water evaporates from an earthen pot (matka).

Ans :

Water seeps through the tiny pores of the earthen pot and evaporates from its outer surface. This evaporation draws heat from the pot and the water inside, causing a cooling effect.

80. Give an example of how the cooling effect of evaporation is used in daily life, apart from the matka.

Ans :

Sprinkling water on the roof or floor during summer cools the area as the water evaporates, taking heat away.

81. How are clouds formed in the atmosphere?

Ans :

Water vapour in the air rises, cools at higher altitudes, and condenses around tiny dust particles to form small water droplets, which collectively appear as clouds.

82. What happens to the tiny water droplets in clouds that leads to rain?

Ans :

Many tiny water droplets in clouds join together to form bigger, heavier drops of water. When these drops become too heavy, they fall as rain.

83. Besides rain, what are the other forms in which condensed water might fall from clouds?

Ans :

Under special conditions, condensed water might also fall as hail or snow from the clouds.

84. Why is only a small portion of Earth's water fit for use by plants, animals, and humans?

Ans :

Most of the Earth's water is in oceans and is saline (salty), which cannot be used directly for drinking or agriculture by most life forms.

85. What is an Atmospheric Water Generator (AWG) and how does it produce drinkable water?

Ans :

An AWG is a machine that collects water from humid air by condensing the water vapour through cooling, similar to how water droplets form on a cold glass.

LONG ANSWER QUESTION

86. Describe the processes of evaporation and condensation. Give one example from daily life where you observe each process.

Ans :

Evaporation is the conversion of a liquid (like water) into its gaseous state (water vapour), often aided by heat.
Example: Wet clothes drying in the sun.
Condensation is the conversion of a gas (water vapour) into its liquid state, usually upon cooling.
Example: Water droplets forming on the outside of a cold drink glass.

87. Compare the properties of water in its three states – solid (ice), liquid (water), and gas (water vapour) – in terms of shape, ability to flow and ability to spread.

Ans :

Ice (solid) has a fixed shape, does not flow, and does not spread. Water (liquid) takes the shape of its container (no fixed shape), flows easily, and can spread while maintaining a constant volume. Water vapour (gas) has no fixed shape and spreads out to fill the entire available space.

88. Explain three conditions that can make water evaporate faster. How does each condition contribute to the increased rate of evaporation?

Ans :

1. Increased surface area : More water molecules are exposed to air, increasing escape.

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boiling. Clinical thermometers have a limited range.

42. Match the state of water in Column A with its characteristic property in Column B:

	Column A		Column B
1.	Ice (Solid state)	A.	Takes the shape of the container and flows easily
2.	Water (Liquid state)	B.	Spreads out to fill the entire available space
3.	Water Vapour (Gaseous state)	C.	Retains its shape and does not flow
4.	Steam	D.	Visible form of water vapour mixed with tiny water droplets

(a) 1-C, 2-A, 3-B, 4-D
(b) 1-A, 2-C, 3-D, 4-B
(c) 1-C, 2-B, 3-A, 4-D
(d) 1-D, 2-A, 3-B, 4-C

Ans :

(a) 1-C, 2-A, 3-B, 4-D
Ice is solid and retains its shape. Liquid water flows and takes the container's shape. Water vapour (gas) spreads to fill space. Steam is visible due to water droplets.

43. Match the process of change of state in Column A with its correct description in Column B:

	Column A		Column B
1.	Evaporation	A.	Change of water vapour into liquid water on cooling
2.	Condensation	B.	Change of liquid water into solid ice on cooling
3.	Melting	C.	Change of liquid water into water vapour on heating/ naturally
4.	Freezing	D.	Change of solid ice into liquid water on heating

(a) 1-D, 2-A, 3-C, 4-B
(b) 1-C, 2-B, 3-D, 4-A
(c) 1-C, 2-A, 3-D, 4-B
(d) 1-A, 2-C, 3-B, 4-D

Ans :

(c) 1-C, 2-A, 3-D, 4-B
Evaporation is liquid to gas. Condensation is gas to liquid. Melting is solid to liquid. Freezing is liquid to solid.

44. Match the phenomenon related to states of water in Column A with its primary cause or example in Column B:

	Column A		Column B
1.	Formation of dew drops on grass	A.	Evaporation of water from the pot's surface
2.	Water in an earthen pot (matka) stays cool	B.	Water vapour in the air condensing on a cold surface
3.	Drying of wet clothes on a windy day	C.	Condensation of water vapour around dust particles in the air
4.	Cloud formation	D.	Increased rate of evaporation due to air movement

(a) 1-C, 2-D, 3-A, 4-B
(b) 1-B, 2-A, 3-D, 4-C
(c) 1-B, 2-D, 3-A, 4-C
(d) 1-D, 2-A, 3-C, 4-B

Ans :

(b) 1-B, 2-A, 3-D, 4-C
Dew forms from condensation of air's water vapour. Earthen pots cool water by evaporation. Wind speeds up clothes drying by enhancing evaporation. Clouds form by condensation around dust.

45. Match the factor affecting evaporation in Column A with its effect on the rate of evaporation in Column B:

	Column A		Column B
1.	Increased surface area	A.	Decreases rate of evaporation
2.	Increased temperature	B.	Increases rate of evaporation
3.	Increased wind speed	C.	Increases rate of evaporation significantly
4.	High humidity	D.	Increases rate of evaporation also

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day. She also spreads the clothes out on the line rather than keeping them bunched up.

(i) Name two conditions present on the sunny and windy day that help the clothes dry faster.

(ii) Why does spreading the clothes out help them dry faster?

(iii) What is the scientific term for the process by which water from the wet clothes turns into vapour?

Ans :

(i) The two conditions are sunlight (providing heat) and wind (increasing air movement), both of which increase the rate of evaporation.

(ii) Spreading the clothes out increases the exposed surface area of the wet fabric, allowing more water to evaporate simultaneously.

(iii) The process is called evaporation.

97. Thirav takes out a bottle of cold water from the refrigerator and places it on a table. After some time, he observes small droplets of water on the outer surface of the bottle. The water level inside the bottle has not changed.

(i) Where do these water droplets on the outer surface of the bottle come from?

(ii) Name the process responsible for the formation of these droplets.

(iii) Why did the water level inside the bottle not change, even though droplets appeared outside?

Ans :

(i) The water droplets come from the water vapour present in the surrounding air.

(ii) The process responsible is condensation.

(iii) The water level inside didn't change because the droplets formed from condensation of external air moisture, not from water seeping out of the sealed bottle.

98. During winter, Aavi notices that the coconut oil kept in a bottle has turned solid. When her mother warms the bottle slightly, the oil turns back into a liquid.

(i) What is the process called when liquid coconut oil turns solid in winter?

(ii) What is the process called when the solid coconut oil turns back into a liquid upon warming?

(iii) Does coconut oil behave similarly to water in terms of changing states with temperature?

Ans :

(i) The process is called freezing (or solidification).

(ii) The process is called melting.

(iii) Yes, like water, coconut oil changes its state from liquid to solid on cooling (freezing) and from solid to liquid on heating (melting).

99. On a hot day, a gardener sprinkles water on the plants and also on the cemented path around the garden. He says this helps to cool the area.

(i) How does sprinkling water help to cool the cemented path?

(ii) Will the cooling effect be more noticeable on a dry day or a humid day? Why?

(iii) What state change is water undergoing when it is sprinkled and then disappears from the path?

Ans :

(i) The sprinkled water evaporates from the hot cemented path. Evaporation is a cooling process as it takes heat from the surface.

(ii) The cooling effect will be more noticeable on a dry day because evaporation occurs faster when the air is dry (low humidity).

(iii) Water is changing from a liquid state to a gaseous state (water vapour).

100. A pot of water is put on a stove to boil. As it heats up, steam starts rising. If a cool metal lid is held over the steam for a few moments, tiny water droplets form on the underside of the lid.

(i) What process causes steam to rise from the boiling water?

(ii) What process causes water droplets to form on the cool metal lid?

(iii) Are the steam rising from the pot and the water droplets on the lid different states of water? Identify them.

Ans :

(i) The process causing steam to rise is evaporation (specifically boiling, which is rapid evaporation throughout the liquid).

(ii) The process causing water droplets to form on the cool lid is condensation.

(iii) Yes, they are different states. The steam contains water in its gaseous state (water vapour), and the droplets on the lid are water in its liquid state.

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2. Higher temperature (e.g., sunlight) : Provides more energy for molecules to change to vapour.
3. Increased air movement (wind) : Carries away evaporated water molecules, allowing more to evaporate from the surface.

89. Describe how an earthen pot (matka) keeps water cool. What scientific principle is involved in this cooling effect?

Ans :

An earthen pot has tiny pores through which a small amount of water seeps to the outer surface. This water evaporates, taking heat energy from the pot and the water inside. This continuous evaporation leads to a cooling effect, keeping the stored water cooler than the surroundings. The principle is 'evaporation causes cooling'.

90. Explain the formation of clouds and how they lead to rain, completing a part of the water cycle.

Ans :

Water from oceans, lakes, and rivers evaporates into the atmosphere as water vapour. This vapour rises, and at higher, cooler altitudes, it condenses around dust particles to form tiny water droplets. These droplets gather to form clouds. When the droplets become large and heavy enough, they fall to Earth as rain.

91. What are the different states of water? Describe how you can change water from its solid state to liquid and then to gaseous state, and vice-versa, mentioning the names of the processes.

Ans :

Water exists in solid (ice), liquid (water), and gaseous (water vapour) states. Heating ice causes it to melt into water (melting). Further heating water causes it to evaporate or boil into water vapour (evaporation/boiling). Cooling water vapour causes it to condense into liquid water (condensation). Further cooling water causes it to freeze into ice (freezing).

92. Water vapour is present in the air around us, even though it is invisible. Describe an activity or observation that provides evidence for this statement.

Ans :

Take a glass tumbler and fill it with ice-cold water. After a few minutes, tiny water droplets will appear on the outer surface of the glass. These droplets are formed because the invisible water vapour present in the surrounding air comes into contact with the cold surface of the glass and condenses into liquid water.

93. Why is it important to use water wisely and avoid wasting it? Mention two ways water gets polluted and why polluted water is a concern.

Ans :

It is important to use water wisely because only a small fraction of Earth's water is freshwater fit for use, and demand is increasing. Water gets polluted by dumping household/industrial waste and trash into water bodies. Polluted water is unfit for consumption and harms aquatic life and ecosystems.

94. Thirav observed water puddles disappearing from the playground. He thought it was absorbed by the soil. Aavi later saw water drying from utensils. What is the common process causing water to disappear in both cases, and what other factor might contribute to water disappearing from puddles?

Ans :

The common process is evaporation, where water turns into water vapour. For puddles on the playground, besides evaporation into the air, some water can also seep into the ground (absorption by soil). So, both processes can contribute to the disappearance of water from puddles.

95. How does humidity affect the rate of evaporation? Explain why clothes take longer to dry on a day with high humidity.

Ans :

Humidity is the amount of water vapour in the air. When humidity is high, the air is already saturated or nearly saturated with water vapour. This reduces the rate at which more water can evaporate from surfaces like wet clothes, hence they dry slower.

CASE BASED QUESTION

96. Aavi's mother hangs freshly washed clothes outside on a sunny and windy day. She notices the clothes dry much faster than on a cloudy, still

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5. SIEVING

1. Definition : Separating components of a mixture based on differences in particle size using a sieve.
2. Principle : Fine particles pass through the holes (pores) of the sieve, while larger particles remain on the sieve. The effectiveness depends on the sieve's pore size relative to the particle sizes.

   Examples : Removing bran and stones from wheat flour using a flour sieve; separating pebbles and stones from sand at construction sites using large sieves.

Figure : Sieving

6. EVAPORATION

1. Definition : The process by which a liquid converts into its vapour.
2. Principle : Used to separate a soluble solid dissolved in a liquid. The liquid evaporates (often aided by heat or sunlight), leaving the solid behind.

   Examples : Obtaining salt from seawater by allowing the water to evaporate in shallow pits under the sun; recovering salt from a salt solution by heating it until the water boils away ; drying herbs in the shade (as in Ayurveda) to remove excess water. White patches on clothes from sweat are also due to evaporation leaving salts behind.

7. SEDIMENTATION AND DECANTATION

1. Sedimentation : The process where heavier, insoluble components in a liquid mixture settle down at the bottom.
2. Decantation : Gently pouring off the upper liquid layer after sedimentation, leaving the settled solid behind.
3. Principle : Based on the difference in weight and insolubility of components.

   Examples : Letting tea leaves settle in tea before pouring (though some leaves might still transfer); separating a mixture of oil and water (oil forms the upper layer); washing rice/pulses where impurities settle or float and water is decanted.

8. FILTRATION

1. Definition : Separating insoluble solid components from a liquid using a filter.
2. Principle : The liquid passes through the fine pores of the filter, while the solid particles are retained on the filter (residue). The clear liquid collected is the filtrate.
3. Filters : Can be a strainer (like for tea leaves), a piece of cloth (pores between threads), or filter paper (very fine pores). Other materials like cotton, charcoal, and sand can also act as filters. The choice depends on the particle size to be removed.

   Examples : Separating tea leaves using a strainer; filtering muddy water using cloth or filter paper (Activity 9.4); catching fish using a net (water drains out, fish are retained).

9. CHURNING

1. Definition : Vigorously stirring or agitating a liquid mixture (like curd) to separate lighter components from heavier ones.
2. Principle : Lighter components (like butterfat) collect together and float, while the heavier liquid (buttermilk) remains.

   Example : Making butter from curd using a mathni (churner) or modern kitchen appliances.

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10. MAGNETIC SEPARATION

1. Definition : Separating magnetic substances from non-magnetic substances using a magnet.
2. Principle : Magnetic substances (like iron) are attracted to the magnet, while non-magnetic substances are not.

   Examples : A carpenter separating iron nails accidentally dropped in sawdust; recyclers separating scrap iron from heaps of waste using large magnets attached to cranes.

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CHAPTER 9

METHODS OF SEPARATION IN EVERYDAY LIFE

1. INTRODUCTION : NEED FOR SEPARATION

The chapter introduces the concept of separating components from mixtures in everyday life through the experiences of Malli and Valli visiting relatives across India. Separation is often necessary to remove unwanted or harmful components (like stones from grain) or to isolate useful components. Mixtures contain two or more substances combined.

2. HANDPICKING

1. Definition : Separating components from a mixture by picking them out manually.
2. Principle : Used when components differ noticeably in size, colour, or shape, and the quantity of the unwanted component is small.
   Examples : Removing small stones and husk from wheat or rice; Malli removing whole black peppers from pulao.

Figure : Handpicking

3. THRESHING

1. Definition : The process of beating harvested stalks to separate grains from the stalks.
2. Method : Traditionally done by beating stalks against a hard surface (like a wooden log). Modern threshing machines (threshers) are also used, which often combine threshing and winnowing.
   Example : Separating wheat grains from harvested wheat stalks.

Figure : Threshing

4. WINNOWING

1. Definition : Separating heavier and lighter components of a mixture using wind or blowing air.
2. Principle : Lighter components (like husk or peanut skins) are blown away by the wind/ air, while heavier components (like grains or peanuts) fall down vertically.
3. Method : Traditionally done using a soop (bamboo tray), often from a raised platform to utilize wind direction. Requires wind or blowing air; ineffective in a closed room without air movement.
   Examples : Separating husk from threshed grains; separating peanut skins from roasted peanuts after rubbing.

Figure : Winnowing

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(ii) Did you get the salt back?

Ans :

(i) You observe the water in the salt solution heating up, boiling, and turning into steam (water vapor), which then escapes into the air.

(ii) Yes, the process of heating the solution and boiling away the water allows you to recover the salt that was originally dissolved.

Activity 9.4 : Let us experiment

1. Try to fold the filter paper yourself and make a cone as shown in Figure.

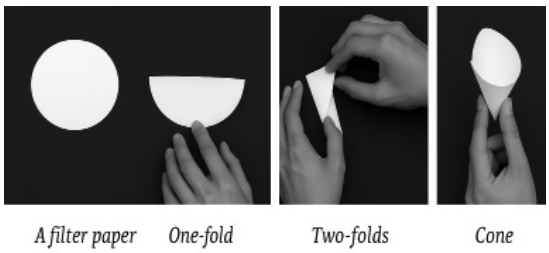

Figure : Folding a filter paper to form a cone

2. Place it inside a funnel kept on a conical flask and pour muddy water into it (Figure)

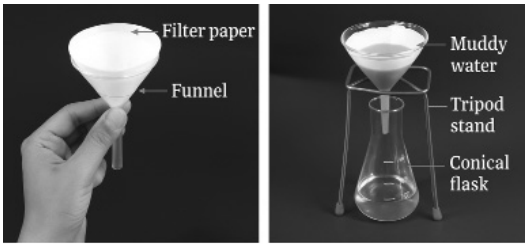

Figure : Filtration

3. What do you observe? Do the mud particles pass through the filter paper?
4. The water coming from the funnel will be collected in the conical flask.
5. You will get mud as a residue on the filter paper and clear water as filtrate in the conical flask.

Ans :

You observe that the liquid (water) passes through the filter paper cone and drips into the conical flask below, while the solid particles (mud) are trapped on the filter paper. The water collected in the flask is clearer than the original muddy water.

No, the mud particles do not pass through the filter paper. They are retained on the filter paper as residue.

Activity 9.5 : Let us design and create

Valli goes for a nature walk with her Dadi and collects some water from a pond in a container. She observes some unwanted substances in it. Design and create a working model of water filter using low-cost materials.

Ans :

Materials Needed:

1. 1 empty plastic bottle (1 or 2 liters)
2. Clean cotton or cotton wool
3. Sand (fine and coarse)
4. Small pebbles or gravel
5. Activated charcoal (optional, for better filtration)
6. A piece of clean cloth or coffee filter
7. Rubber band or string
8. Scissors or knife
9. Dirty water sample (pond water)
10. A clean glass or jar to collect filtered water

Steps to Create the Water Filter:

1. Cut the plastic bottle into two parts. Use the top half as a funnel.
2. Prepare the filter layers (from bottom to top):
   (i) First layer (bottom) : small pebbles
   (ii) Second layer : coarse sand
   (iii) Third layer : fine sand
   (iv) Fourth layer : activated charcoal (if available)
   (v) Fifth layer : cotton wool
   (vi) Cover the mouth of the bottle with a piece of cloth and secure it with a rubber band.
3. Place the funnel (top half of the bottle with layers) into the bottom half or a separate container to collect water.
4. Pour the pond water slowly into the filter and observe how clean water comes out from the bottom.

Observation:

1. The filtered water is clearer and free from visible dirt and particles.
2. Larger particles are trapped by pebbles and sand, while finer particles are absorbed by cotton and charcoal.

Activity 9.6 : Let us play

Write the following phrases on small slips of paper

1. Separating small stones from pulses.
2. Churning curd to obtain butter.

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11. In the context of making tea, what method does Dada first suggest for removing most tea leaves if a strainer is not available?
(A) Filtration using a cloth.
(B) Magnetic separation.
(C) Decantation after allowing tea leaves to settle.
(D) Evaporation of the tea.

Ans :

(C) Decantation after allowing tea leaves to settle.
Dada explains that if a strainer isn't available, one can leave the tea undisturbed for some time (sedimentation of tea leaves) and then gently pour the tea into a cup (decantation).

12. Why might decantation not completely separate all tea leaves from tea?
(A) Because tea leaves are soluble in hot tea.
(B) Because some finer tea leaves might remain suspended or get poured along with the liquid.
(C) Because decantation only works for separating liquids from liquids.
(D) Because the tea is too hot for complete separation.

Ans :

(B) Because some finer tea leaves might remain suspended or get poured along with the liquid.
While heavier tea leaves settle, some smaller or lighter particles may remain suspended in the tea or get disturbed and poured out with the liquid during decantation, making the separation incomplete.

13. What is filtration?
(A) The process of beating stalks to separate grains.
(B) The process of separating insoluble solid components from a liquid using a filter.
(C) The process of separating substances based on their weight using wind.
(D) The process of allowing heavier particles to settle in a liquid.

Ans :

(B) The process of separating insoluble solid components from a liquid using a filter.
Filtration involves passing a mixture of a liquid and insoluble solids through a filter (like a strainer, cloth or filter paper). The liquid passes through, while the solid particles are retained by the filter.

14. What material, with very fine pores, is mentioned as being a more effective filter than a cloth for separating fine impurities from muddy water?
(A) A metal sieve
(B) A plastic mesh
(C) Filter paper
(D) A bamboo tray

Ans :

(C) Filter paper
Filter paper has extremely fine pores that can trap very small insoluble particles, making it more effective than a cloth for separating fine impurities like mud from water.

15. How does filtration using a filter paper differ from sieving wheat flour?
(A) Filtration separates two solids; sieving separates a solid from a liquid.
(B) Filtration separates an insoluble solid from a liquid; sieving separates solid particles of different sizes.
(C) Filtration uses large pores; sieving uses very fine pores.
(D) Filtration always uses heat; sieving is done at room temperature.

Ans :

(B) Filtration separates an insoluble solid from a liquid; sieving separates solid particles of different sizes.
Filtration is used to separate undissolved solids from a liquid (e.g., mud from water). Sieving is used to separate solid components of different particle sizes from each other (e.g., bran from flour).

16. A fisherman casts a net into the water. Water drains out through the mesh of the net, while fish are caught. This method of catching fish is somewhat similar to which separation technique?
(A) Evaporation
(B) Sedimentation
(C) Filtration
(D) Magnetic separation

Ans :

(C) Filtration
The fishing net acts like a filter. It allows the water (liquid) to pass through its mesh while retaining the larger fish (solid components), similar to how a filter separates solids from liquids.

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4. State True (T) or False (F). Correct each false statement.

(i) Salt can be separated from salt solution by keeping it under the Sun.

(ii) Hand-picking should be used only when the quantity of one component is less.

(iii) A mixture of puffed rice and rice grains can be separated by threshing.

(iv) A mixture of mustard oil and lemon water can be separated by decantation.

(v) Sieving is used to separate a mixture of rice flour and water.

Ans :

(i) True, Sunlight heats the solution; water evaporates, leaving salt crystals (evaporation).

(ii) True, The method is practical only when the unwanted component is present in a small amount.

(iii) False, Correct : It can be separated by winnowing (blowing air) or hand-picking, not threshing (which separates grains from stalks).

(iv) True, Oil and water form two layers; the upper oil layer can be decanted or removed with a separating funnel.

(v) False, Correct : Filtration (using filter paper or muslin) separates flour from water; sieving works only for dry solids of different sizes.

5. Match Column I with Column II

	Column I (Mixture)		**Column II (Method)**
(i)	Gram-flour mixed with black-gram seeds	(a)	Hand-picking
(ii)	Chalk powder mixed with water	(b)	Magnetic separation
(iii)	Corn mixed with potatoes	(c)	Decantation
(iv)	Iron powder mixed with sawdust	(d)	Sieving
(v)	Oil mixed with water	(e)	Filtration

Ans :

(i) → (d), (ii) → (e), (iii) → (a), (iv) → (b), (v) → (c).

6. In what situations would you use decantation instead of filtration to separate solids from liquids?

Ans :

Use decantation (simply pouring off the clear liquid) when:

1. The solid is heavy and settles to the bottom quickly, like sand or mud in water.
2. Two liquids don't mix and form layers, e.g., oil floating on water.
3. You only need a quick, rough separation—perfect clarity is not required.
4. Large lumps or crystals might clog filter paper and you want to save time and materials.

7. Can you relate the presence of nasal hair to any separation process?

Ans :

Yes. Nasal hairs work like a natural filter : as air passes through our nose, the hairs trap dust, pollen and other large particles while letting the clean air move on to the lungs. This is similar to the filtration method of separation, where a filter medium holds back solid impurities and allows the fluid to pass through.

8. During the COVID-19 pandemic, all of us wore masks. Generally, what material are they made of? What is the role of these masks?

Ans :

Material : Most medical (surgical) masks are made of thin, non-woven plastic fibres called polypropylene. Simple reusable masks are usually made of tightly woven cotton cloth in two or three layers.

Role : The mask works like a tiny filter. It traps the saliva droplets we breathe, talk, cough or sneeze out, so fewer germs reach other people, and it also blocks many droplets in the air from reaching our own nose and mouth. In this way masks help slow the spread of viruses such as COVID-19.

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9. A mixture containing potatoes, salt and sawdust has been given to you. Outline a stepwise procedure for separating each component from this mixture.

Ans :

1. Hand-pick potatoes and set them aside.
2. Stir the remaining mix in water.
   (i) Salt dissolves.
   (ii) Sawdust floats.
3. Scoop off the floating sawdust.
4. Boil the salt solution; water evaporates and crystals of salt remain.

34. A construction worker needs to separate small pebbles and stones from a heap of sand to make fine mortar. Which method would be most suitable?
(A) Winnowing
(B) Handpicking (if pebbles are few and large) or Sieving (if pebbles are many and smaller)
(C) Magnetic separation
(D) Evaporation

Ans :

(B) Handpicking (if pebbles are few and large) or Sieving (if pebbles are many and smaller)
If the pebbles are relatively large and not too numerous, handpicking might be feasible. However, for a larger quantity or smaller pebbles mixed with sand, sieving with an appropriate mesh size would be more efficient.

35. **Assertion (A) :** Modern threshing machines can perform both threshing and winnowing simultaneously.
Reason (R) : These machines are designed to beat grains from stalks and then use air currents to separate the lighter husk.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Modern combine harvesters and threshers are engineered to first separate grains from the stalks (threshing) and then immediately use built-in fans or air blowers to remove the lighter chaff and husk (winnowing).

36. Which of the following actions demonstrate a method of separation?
1. Malli separating black peppers from pulao.
2. Valli helping Mami knead wheat flour.
3. Farmers beating stalks to separate grains.
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(C) 1 and 3 only
Malli separating peppers is handpicking. Farmers beating stalks is threshing. Kneading flour is a process of mixing and preparation, not separation of existing components.

37. In a science experiment, students mix chalk powder with water. After stirring, the chalk powder gradually settles at the bottom of the beaker.
The process of chalk powder settling is called (I)_____, and pouring off the water is called (II)_____.
(A) (I) Filtration, (II) Evaporation
(B) (I) Sedimentation, (II) Decantation
(C) (I) Sieving, (II) Churning
(D) (I) Condensation, (II) Threshing

Ans :

(B) (I) Sedimentation, (II) Decantation
Chalk powder is insoluble and heavier than water, so it settles down (sedimentation). The careful pouring of the clearer liquid from the top, without disturbing the settled solid, is decantation.

38. Why is it that when salt dissolves in water, it seems to disappear, but when sand is mixed with water, it remains visible?
(A) Salt is lighter than sand.
(B) Salt is soluble in water, meaning its particles spread out uniformly; sand is insoluble.
(C) Salt reacts chemically with water; sand does not.
(D) Water evaporates faster from a salt solution than from a sand mixture.

Ans :

(B) Salt is soluble in water, meaning its particles spread out uniformly; sand is insoluble.
Soluble substances like salt break down into very tiny particles that disperse evenly throughout the water, making them invisible. Insoluble substances like sand do not dissolve and their larger particles remain visible.

39. The process of separating insoluble particles that get filtered out and remain on the filter paper is known as the:
(A) Filtrate
(B) Solution
(C) Residue
(D) Sediment

Ans :

(C) Residue

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traditionally done by beating the stalks against a hard surface or by using animals or machines.

5. What happens when roasted peanuts are rubbed between palms and then blown upon?
(A) The peanuts become softer and easier to eat.
(B) The heavier peanuts are blown away, leaving the skins.
(C) The lighter peanut skins are blown away, separating them from the heavier peanuts.
(D) Both peanuts and skins stick together and cannot be separated by blowing.

Ans :

(C) The lighter peanut skins are blown away, separating them from the heavier peanuts.
Rubbing loosens the skins from the peanuts. When blown, the lighter skins are carried away by the air, while the heavier peanuts remain, demonstrating a simple separation based on weight.

6. The method of winnowing is based on what principle to separate components of a mixture?
(A) Difference in color of the components.
(B) Difference in size of the components.
(C) Difference in weight, where lighter components are blown away by wind or air.
(D) Difference in magnetic properties of the components.

Ans :

(C) Difference in weight, where lighter components are blown away by wind or air.
Winnowing utilizes wind or blowing air to separate lighter components (like husk or chaff) from heavier components (like grains). The lighter particles are carried away, leaving the heavier ones behind.

7. What is sieving used for?
(A) Separating dissolved solids from a liquid.
(B) Separating magnetic substances from non-magnetic ones.
(C) Separating components of a solid-solid mixture that have different sizes using a sieve.
(D) Separating heavier components from lighter ones using wind.

Ans :

(C) Separating components of a solid-solid mixture that have different sizes using a sieve.
Sieving employs a sieve (a mesh or perforated surface) to separate solid particles of different sizes. Smaller particles pass through the holes, while larger ones are retained.

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8. How is common salt primarily obtained from seawater, as described ?
(A) By filtering the seawater through large sieves.
(B) By allowing seawater to evaporate in shallow pits, leaving behind solid salt.
(C) By boiling the seawater and collecting the condensed steam.
(D) By adding chemicals to seawater that precipitate the salt.

Ans :

(B) By allowing seawater to evaporate in shallow pits, leaving behind solid salt.
Salt is obtained from seawater by collecting the water in shallow pits and allowing the sun and wind to evaporate the water. The dissolved salts are left behind as a solid mixture.

9. In Activity 9.2, when a salt solution is spread on dark paper and allowed to dry, what is left behind on the paper?
(A) Only water stains.
(B) Patches of salt, as the water evaporates.
(C) The paper turns completely black.
(D) Nothing is left behind as both salt and water evaporate.

Ans :

(B) Patches of salt, as the water evaporates.
When the salt solution dries, the water component changes into vapour (evaporates) and escapes into the air. The dissolved salt, being a solid, remains on the paper as patches.

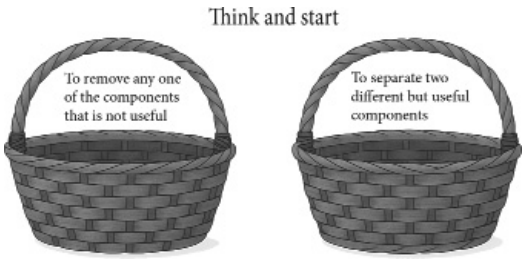
10. What is sedimentation?
(A) The process of pouring out a liquid without disturbing the settled solids.
(B) The process of separating solids from a liquid using a filter.
(C) The process of settling down of heavier insoluble components at the bottom of a liquid.
(D) The process of converting a liquid into its vapour.

Ans :

(C) The process of settling down of heavier insoluble components at the bottom of a liquid.
Sedimentation occurs when a mixture of a liquid and insoluble heavier solids is left undisturbed. The heavier solid particles gradually settle down to the bottom of the container.

3. Taking out green chillies from cooked dalia (dish made of broken wheat) or poha (dish made of flattened rice).
4. Taking out seeds from watermelon.
5. Sorting piles of sawdust and iron nails from a mixed heap of building material.
6. Picking marigold flowers from a heap of other flowers to make a garland.
7. Separating pebbles from sand.
8. Separating coconut pieces from rice flour.
9. Separating oil from water.
10 Separating salt from salt solution.

Now, take two baskets, each representing one of the two purposes for which we separate substances. Form two teams and see who will get the maximum correct entries.



Ans :

Basket 1 : To remove any one of the components that is not useful (Removing unwanted or harmful components)

1. Separating small stones from pulses. (Stones are not useful/harmful)
2. Taking out green chillies from cooked dalia or poha. (Assuming the person eating doesn't want the chillies - removing unwanted component)
3. Taking out seeds from watermelon. (Seeds are often discarded - removing unwanted component)
4. Separating pebbles from sand. (Usually, pebbles are considered impurities in sand - removing unwanted component)
5. Separating coconut pieces from rice flour. (Coconut pieces might be considered an unwanted impurity in the flour)

Basket 2 : To separate two different but useful components (Obtaining two or more desired substances)

1. Churning curd to obtain butter. (Both butter and the remaining buttermilk can be useful)
2. Sorting piles of sawdust and iron nails from a mixed heap of building material. (Both sawdust and iron nails can have uses, separation is for utility)
3. Picking marigold flowers from a heap of other flowers to make a garland. (Marigolds are useful for the garland, other flowers might be useful for other purposes)
4. Separating oil from water. (Both oil and water are distinct, often useful substances)
5. Separating salt from salt solution. (To obtain useful salt from the water)

NCERT EXERCISE

1. What purpose does hand-picking serve in the process of separation?
(i) Filtration
(ii) Sorting
(iii) Evaporation
(iv) Decantation

Ans :

(ii) Sorting
Hand-picking is used to sort out and remove unwanted pieces (stones, twigs, spoiled grains, etc.) from a mixture.

2. Which of the following substances are commonly separated using the churning method?
(i) Oil from water
(ii) Sand from water
(iii) Cream from milk
(iv) Oxygen from air

Ans :

(iii) Cream from milk
Churning (or buttering) spins curd or milk so that the lighter fat (cream/butter) rises and can be skimmed off.

3. Which factor is usually essential for filtration?
(i) Apparatus size
(ii) Presence of air
(iii) Pore size
(iv) Temperature of the mixture

Ans :

(iii) Pore size
Whether a particle passes through a filter depends on the size of the pores in the filter material.

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17. What is churning primarily used for, as described?
(A) To separate stones from rice.
(B) To separate butter from curd or cream.
(C) To separate salt from seawater.
(D) To separate husk from grains.

Ans :

(B) To separate butter from curd or cream.
Churning is the process of vigorously agitating curd or cream. This agitation causes the lighter butterfat particles to clump together and separate from the liquid buttermilk.

18. When churning curd, what happens to the butter and buttermilk?
(A) Butter settles at the bottom, and buttermilk floats.
(B) Butter, being lighter, floats at the top, while buttermilk is left behind.
(C) Both mix uniformly and cannot be separated by churning.
(D) Buttermilk evaporates, leaving solid butter.

Ans :

(B) Butter, being lighter, floats at the top, while buttermilk is left behind.
During the churning process, the lighter butterfat coagulates and floats on the surface of the heavier liquid, which is the buttermilk.

19. Why can a magnet be used to separate iron nails from sawdust?
(A) Because sawdust is magnetic, and iron nails are not.
(B) Because iron nails are magnetic and are attracted to the magnet, while sawdust is non-magnetic.
(C) Because both iron nails and sawdust are attracted to magnets equally.
(D) Because magnets repel sawdust and attract iron nails.

Ans :

(B) Because iron nails are magnetic and are attracted to the magnet, while sawdust is non-magnetic.
Iron is a magnetic material, meaning it is attracted to magnets. Sawdust is non-magnetic. Therefore, when a magnet is moved through the mixture, it will pick up the iron nails, leaving the sawdust behind.

20. What is magnetic separation?
(A) Separating substances based on their color using magnets.
(B) Separating magnetic and non-magnetic substances from a mixture using a magnet.
(C) Using magnets to dissolve substances in water.
(D) Breaking magnets into smaller pieces.

Ans :

(B) Separating magnetic and non-magnetic substances from a mixture using a magnet.
Magnetic separation is a method that utilizes the property of magnetism to separate materials that are attracted to a magnet (magnetic) from those that are not (non-magnetic).

21. What is the traditional tool of ten used by farmers for winnowing grains, as shown in Figure (a) and (b)?

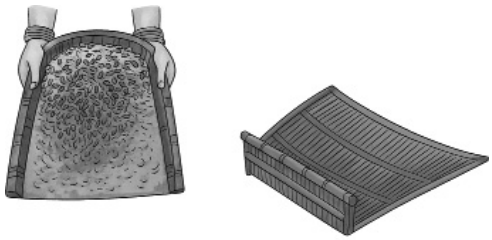

Figure : (a) Bamboo tray

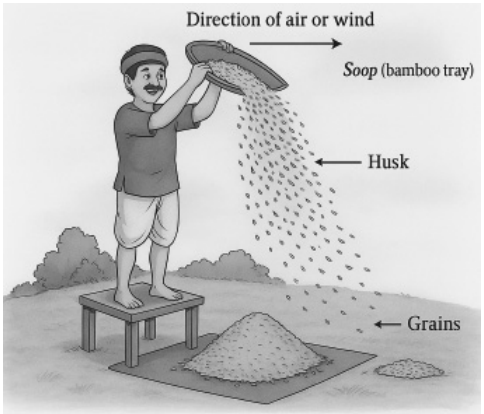

Figure : (b) Winnowing

(A) A metal sieve
(B) A filter paper cone
(C) A soop (bamboo tray)
(D) A threshing machine

Ans :

(C) A soop (bamboo tray)
A soop is a traditional winnowing tray, usually made of bamboo, used to separate husk from grains by allowing the wind to blow the lighter husk away.

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10. Read the following story titled 'Intelligent Leela' and tick the most appropriate options. Provide a suitable title of your choice for the paragraph.
Leela was working in the farm with her father when she realized that they left their drinking water at home. Before her father felt thirsty/ hungry, she went to the nearby pond to fetch some water/grains. After obtaining some water in the container, she noticed that the water was muddy and fit/unfit for drinking. To purify the water, she kept it for some time and then she filtered/churned the muddy water using a piece of paper/muslin cloth. Leela, then, cooled/boiled the water for about 10 minutes in a covered pan. After cooling/boiling, she filtered/churned ita gain and made it fit/unfit for drinking. She served this water other father while having food, who blessed her and appreciated her efforts.

Ans :

Paragraph with the correct words filled in Leela was working in the farm with her father when she realized that they had left their drinking water at home. Before her father felt thirsty, she went to the nearby pond to fetch some water. After obtaining some water in the container, she noticed that it was muddy and unfit for drinking. To purify it, she kept the water for a while and then filtered it through a piece of muslin cloth. Leela then boiled the water for about ten minutes in a covered pan. After cooling, she filtered it once more and made it fit to drink. She served the water to her father during their meal, and he blessed her for her thoughtful effort.

MULTIPLE CHOICE QUESTION

1. What is handpicking as a method of separation?
(A) Separating substances using a sieve.
(B) Picking substances by hand from a mixture based on differences in size, color, or shape.
(C) Using a magnet to separate magnetic materials.
(D) Allowing heavier particles to settle down in water.

Ans :

(B) Picking substances by hand from a mixture based on differences in size, color, or shape.
Handpicking is a simple separation method where undesirable components are manually removed from a mixture. This is effective when there are visible differences in size, color, or shape between the components.

2. In the story, what were Malli's Nani and other community members separating from grains by handpicking?
(A) Different types of grains from each other.
(B) Small stones and husk from the grains.
(C) Larger grains from smaller grains.
(D) Colored grains from white grains.

Ans :

(B) Small stones and husk from the grains.
Malli and Valli observed their relatives handpicking to remove unwanted small stones and pieces of husk from the harvested grains to make them fit for cooking.

3. When is handpicking a convenient method of separation?
(A) When the particles to be removed are very small and numerous.
(B) When the particles to be removed are present in small quantities and are easily picked by hand.
(C) When all components of the mixture are identical in appearance.
(D) When the mixture is a liquid.

Ans :

(B) When the particles to be removed are present in small quantities and are easily picked by hand.
Handpicking is practical if the unwanted particles are few, relatively large, and visually distinct, allowing for easy manual removal without excessive time or effort.

4. What is threshing?
(A) The process of grinding grains into flour.
(B) The process of separating grains from the stalks by beating.
(C) The process of separating husk from grains using wind.
(D) The process of handpicking stones from grains.

Ans :

(B) The process of separating grains from the stalks by beating.
Threshing is the method used to detach edible grains from their harvested stalks or chaff,

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To separate coarser particles (like bran or small stones) from fine wheat flour, sieving is the ideal method. The fine flour will pass through the sieve, while the larger impurities will be retained.

28. According to Kabir's doha (couplet), what action does a soop (winnowing fan) perform with grains and husk?
(A) It mixes them together thoroughly.
(B) It retains the husk and lets the grains blow away.
(C) It lets the husk blow away while retaining the grains.
(D) It grinds both grains and husk into powder.

Ans :

(C) It lets the husk blow away while retaining the grains.
The doha uses the analogy of a winnowing fan (soop) which separates the undesirable husk (letting it blow away) from the valuable grains (retaining them), just as wise people retain virtues and discard vices.

29. Why is it important to remove stones from grains before cooking?
(A) Stones add a unique flavor to the food.
(B) Stones make the food easier to digest.
(C) Stones are inedible, can damage teeth, and make the food unfit for consumption.
(D) Stones help the grains cook faster.

Ans :

(C) Stones are inedible, can damage teeth, and make the food unfit for consumption.
Stones are hard, inedible impurities. If present in food, they can be unpleasant to eat, potentially damage teeth, and generally make the food unsafe or undesirable.

30. The liquid that is poured out after sedimentation, leaving the settled solids behind, is part of which process?
(A) Filtration
(B) Evaporation
(C) Decantation
(D) Churning

Ans :

(C) Decantation
Decantation is the process of carefully pouring off the liquid from a mixture after the heavier, insoluble solid particles have settled at the bottom through sedimentation.

31. In the Arrived system mentioned, why are herbs or parts of plants often dried in the shade?
(A) To enhance their color and fragrance.
(B) To facilitate the evaporation of excess water, leaving behind the medicinal components.
(C) To protect them from insects and pests.
(D) To make them easier to grind into a powder.

Ans :

(B) To facilitate the evaporation of excess water, leaving behind the medicinal components.
Drying medicinal plants in the shade helps to slowly remove excess moisture through evaporation. This concentrates the active medicinal compounds and aids in preservation.

32. What is a key difference between the residue and the filtrate obtained after filtration?
(A) Residue is the liquid that passes through; filtrate is the solid retained.
(B) Residue is the solid retained on the filter; filtrate is the liquid that passes through.
(C) Both residue and filtrate are solids of different sizes.
(D) Both residue and filtrate are liquids of different clarity.

Ans :

(B) Residue is the solid retained on the filter; filtrate is the liquid that passes through.
In filtration, the insoluble solid particles that are trapped and remain on the filter medium (like filter paper) are called the residue. The clear liquid that passes through the filter is called the filtrate.

33. Which of these separation methods would be LEAST effective for separating a mixture of oil and water?
(A) Decantation (after allowing them to separate into layers)
(B) Using a separating funnel (a specialized decantation device)
(C) Sieving
(D) Allowing the oil to float and skimming it off.

Ans :

(C) Sieving
Oil and water are immiscible liquids that form separate layers. Decantation or a separating funnel can be used. Sieving is for separating solids of different sizes or solids from liquids, not two immiscible liquids.

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22. What is the main difference between threshing and winnowing?
(A) Threshing separates grains from stalks; winnowing separates husk from grains.
(B) Threshing uses wind; winnowing involves beating.
(C) Threshing is done by hand; winnowing always requires machines.
(D) Threshing separates larger impurities; winnowing separates smaller ones.

Ans :

(A) Threshing separates grains from stalks; winnowing separates husk from grains.
Threshing is the process of detaching the grains from the harvested plant stalks. Winnowing is the subsequent process of separating the lighter husk or chaff from these threshed grains using air currents.

23. Which of the following methods would NOT be suitable for separating a mixture of salt dissolved in water to recover both salt and water?
(A) Evaporation followed by condensation.
(B) Simple evaporation (if only salt is needed).
(C) Filtration.
(D) Distillation (a more advanced form of evaporation and condensation).

Ans :

(C) Filtration.
Salt dissolves in water to form a solution. Filtration is used to separate insoluble solids from liquids, so it would not be effective in separating dissolved salt from water. Evaporation and condensation can recover both.

24. If you have a mixture of sand and sugar, and you add water to it and stir, how can you then separate the sugar from the sand?
(A) By handpicking the sugar crystals.
(B) By using a magnet to attract the sugar.
(C) By decantation/filtration (to remove sand) followed by evaporation (to recover sugar from solution).
(D) By winnowing the wet mixture.

Ans :

(C) By decantation/filtration (to remove sand) followed by evaporation (to recover sugar from solution).
Sugar will dissolve in water, but sand will not. The sand can be separated by decantation or filtration. Then, the sugar can be recovered from the sugar-water solution by evaporating the water.

25. **Assertion (A) :** Sieving can be used to separate flour from bran.
Reason (R) : Flour particles are smaller and pass through the sieve, while larger bran particles are retained.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Sieving separates components based on particle size. In the case of flour and bran, the finer flour particles can pass through the mesh of a sieve, while the coarser bran particles remain on top.

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26. Which of the following methods rely on the difference in weight/density of components for separation?
1. Winnowing
2. Sedimentation
3. Handpicking
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(A) 1 and 2 only
Winnowing separates lighter husk from heavier grains using wind. Sedimentation allows heavier insoluble particles to settle down in a liquid. Handpicking is based on visual differences like size or color, not primarily weight.

27. Mami is preparing meethi puri and wants to remove any coarse particles or impurities from the wheat flour before kneading it.
Which method of separation would be most appropriate for Mami to use?
(A) Winnowing
(B) Sieving
(C) Sedimentation
(D) Evaporation

Ans :

(B) Sieving

When a mixture is filtered, the insoluble solid material that is caught by and remains on the filter (e.g., filter paper) is termed the residue.

40. What did Malli and Valli observe a group of farmers doing with harvested wheat stalks in the fields?
(A) Grinding them into flour.
(B) Soaking them in water.
(C) Beating the stalks on a large wooden log.
(D) Weaving them into mats.

Ans :

(C) Beating the stalks on a large wooden log.
The chapter describes Malli and Valli seeing farmers beating wheat stalks on a wooden log. This action is part of the threshing process to separate the grains from the stalks.

41. If Valli is unable to separate husk from rice in a closed room using winnowing, what is the most likely reason?
(A) The rice grains are too heavy.
(B) The husk is too sticky.
(C) There is no wind or blowing air to carry the lighter husk away.
(D) The room is too dark to see the components properly.

Ans :

(C) There is no wind or blowing air to carry the lighter husk away.
Winnowing relies on wind or a current of air to separate lighter components (like husk) from heavier ones (like rice grains). In a closed room without airflow, this method will be ineffective.

42. What are threshers as mentioned in the More to know! box?
(A) Traditional bamboo trays used for sieving.
(B) Machines used for separating grains from stalks and husk, performing threshing and winnowing.
(C) Handheld tools for beating small quantities of grains.
(D) Large containers used for storing threshed grains.

Ans :

(B) Machines used for separating grains from stalks and husk, performing threshing and winnowing.
The More to know box explains that threshers are technological advancements—machines that perform both the task of separating grains from stalks (threshing) and separating husk from grains (winnowing) simultaneously.

43. Before making meethi puri, Valli's Mami needed to remove bran from the wheat flour. Which method did she use for this?
(A) Handpicking
(B) Winnowing
(C) Sieving
(D) Sedimentation

Ans :

(C) Sieving
Mami explains that a sieve is used to remove bran from flour. Sieving allows the fine flour particles to pass through while retaining the larger bran particles on the sieve.

44. How does the size of particles that pass through a sieve compare to the size of particles that remain on the sieve?
(A) Particles that pass through are larger than those that remain.
(B) Particles that pass through are the same size as those that remain.
(C) Particles that pass through are smaller than those that remain on the sieve.
(D) Size does not matter in the process of sieving.

Ans :

(C) Particles that pass through are smaller than those that remain on the sieve.
A sieve works by having holes of a specific size. Smaller particles can pass through these holes, while larger particles are too big and are therefore retained on the surface of the sieve.

45. Which of the following methods of separation would be LEAST suitable for separating tea leaves from prepared tea?
(A) Filtration using a strainer.
(B) Decantation after sedimentation.
(C) Evaporation.
(D) Using a filter paper.

Ans :

(C) Evaporation.
Filtration (with a strainer or filter paper) and decantation are suitable for separating tea leaves (solid) from tea (liquid). Evaporation would remove the water component, leaving behind concentrated tea solids, which is not the desired outcome for this purpose.

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98. Why is it necessary to separate substances from a mixture? Give one reason.

Ans :

Separation is necessary to remove undesirable or harmful components, or to obtain useful components from a mixture, making them fit for use or consumption.

99. What kind of substances can be separated using magnetic separation?

Ans :

Magnetic separation is used to separate substances that are attracted to a magnet (magnetic substances like iron) from those that are not (non-magnetic substances).

100. Why would a farmer use a thresher machine instead of traditional threshing and winnowing?

Ans :

A thresher machine is more efficient as it performs both threshing (separating grains from stalks) and winnowing (separating grains from husk) simultaneously, saving time and labor.

101. If you spill iron filings in sugar, which method of separation would be most effective and why?

Ans :

Magnetic separation would be most effective. A magnet can be used to attract and remove the iron filings, leaving the sugar behind, as sugar is non-magnetic.

102. Why can't sieving be used to separate salt dissolved in water?

Ans :

Sieving separates solids of different sizes. When salt is dissolved in water, it breaks down into particles too small to be caught by a sieve.

103. Malli handpicked black peppers from his pulao. What was the basis for this separation?

Ans :

Malli separated the black peppers based on visible differences in colour (black peppers vs. other ingredients) and shape, making them easy to pick out by hand.

104. Give an example of a mixture from which two different but useful components are separated.

Ans :

Churning curd separates butter (useful for eating/cooking) and buttermilk (useful as a drink), both of which are useful components.

LONG ANSWER QUESTION

105. Describe the method of winnowing. What kind of mixtures can be separated by this method? Give an example from daily life or agriculture.

Ans :

Winnowing separates heavier components from lighter ones using wind or by blowing air. The mixture is dropped from a height; lighter particles (like husk) are blown away, while heavier particles (like grains) fall vertically. It's used for mixtures of solids with different weights, like separating wheat grains from husk by farmers.

106. Explain the processes of sedimentation and decantation with an example. When would you choose this combination of methods for separation?

Ans :

Sedimentation is when heavier, insoluble solids in a liquid settle at the bottom (e.g., mud in muddy water). Decantation is then gently pouring off the clear liquid from the top, leaving the sediment. This combination is used when an insoluble solid is mixed with a liquid and the solid is dense enough to settle quickly.

107. What is filtration? Describe how you would use a filter paper and a funnel to separate mud from muddy water. What are the separated components called?

Ans :

Filtration separates insoluble solids from a liquid using a filter. To separate mud from water, fold a filter paper into a cone shape, place it in a funnel. Pour the muddy water through it. The mud particles (residue) will be trapped by the filter paper, and clear water (filtrate) will pass through into the container below.

108. Describe the method of evaporation for separating a solid dissolved in a liquid. How is this method used in obtaining common salt from seawater?

Ans :

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Filter paper is specifically manufactured to have very small, uniform pores. These fine pores are capable of trapping much smaller particles, like fine mud, compared to the larger gaps between the threads in a piece of woven cloth.

52. What is a mixture?
(A) A pure substance with a fixed composition.
(B) A combination of two or more substances that are not chemically bonded.
(C) A substance that cannot be broken down into simpler parts.
(D) A liquid that can dissolve other substances.

Ans :

(B) A combination of two or more substances that are not chemically bonded.
The separating components from various combinations like grains and stones, or salt and water. These are examples of mixtures, where different substances are physically combined but retain their individual properties.

53. Which of these locations is mentioned as a place where Malli and Valli's family uses handpicking to clean grains?
(A) Ahmedabad, Gujarat
(B) Puducherry
(C) Nani's house in Haryana
(D) Bhopal, Madhya Pradesh

Ans :

(C) Nani's house in Haryana
The story begins with Malli and Valli visiting their Nani's house in Haryana, where they observe community members, including their Mami and Mama, handpicking stones and husk from grains.

54. How does the process of obtaining salt from seawater primarily differ from separating tea leaves from tea using a strainer?
(A) Salt extraction involves evaporation; tea separation involves filtration.
(B) Salt extraction is a chemical change; tea separation is a physical change.
(C) Salt extraction removes a liquid from a solid; tea separation removes a solid from a liquid.
(D) Salt extraction uses magnets; tea separation uses sieves.

Ans :

(A) Salt extraction involves evaporation; tea separation involves filtration.
Obtaining salt from seawater relies on evaporating the water to leave the dissolved solid salt behind. Separating tea leaves from liquid tea using a strainer is a form of filtration, where insoluble solids are separated from a liquid.

55. Which of the following is NOT a reason why we separate substances from a mixture, as implied by the chapter?
(A) To remove undesirable or harmful components.
(B) To obtain two or more different but useful components.
(C) To change the chemical properties of the substances.
(D) To make substances fit for consumption or use.

Ans :

(C) To change the chemical properties of the substances.
The methods of separation discussed (handpicking, sieving, evaporation, etc.) are physical methods that separate components based on their physical properties. They do not typically aim to cause chemical transformations in the substances themselves.

56. A gardener has a mixture of soil and larger pebbles. To prepare fine soil for potting small seedlings, which separation method would be most appropriate?
(A) Winnowing
(B) Sieving
(C) Magnetic separation
(D) Decantation

Ans :

(B) Sieving
Sieving the mixture through a mesh of appropriate size will allow the fine soil particles to pass through while retaining the larger pebbles on the sieve.

57. **Assertion (A) :** When churning curd, butter separates from buttermilk.
Reason (R) : Butter is lighter than buttermilk and floats to the top during agitation.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.

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The process of churning causes the fat globules in curd to coalesce and form butter. Since butter (fat) is less dense (lighter) than the remaining liquid (buttermilk), it rises to the surface.

58. Which of these separation techniques are based on the difference in the size of the components?
1. Handpicking
2. Sieving
3. Filtration

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(D) 1, 2, and 3
Handpicking often involves picking out larger or visibly different sized impurities. Sieving explicitly separates based on particle size using a mesh. Filtration separates insoluble solids from liquids based on the solid particles being larger than the pores of the filter.

59. At a construction site, a large electromagnet is used to lift and move scrap iron from a pile of rubble containing wood, concrete, and plastic. This process is an industrial application of:
(A) Sieving
(B) Winnowing
(C) Magnetic separation
(D) Filtration

Ans :

(C) Magnetic separation
Iron is a magnetic material. Using an electromagnet to attract and separate it from a mixture of non-magnetic materials like wood, concrete, and plastic is a clear example of magnetic separation on a large scale.

MATCHING TYPE QUESTION

60. Match the condition in Column A with its effect on the rate of evaporation in Column B:

	Column A		**Column B**
1.	A Spreading water on a plate	A.	Evaporation is slower (e.g., on rainy days)
2.	A hot sunny day	B.	Evaporation is faster due to larger exposed area
3.	A windy day	C.	Evaporation is faster due to higher energy
4.	Air with high water vapour content	D.	Evaporation is faster due to air movement

(a) 1-D, 2-A, 3-C, 4-B
(b) 1-B, 2-C, 3-D, 4-A
(c) 1-B, 2-A, 3-D, 4-C
(d) 1-C, 2-D, 3-B, 4-A

Ans :

(b) 1-B, 2-C, 3-D, 4-A
Spreading water increases surface area, speeding evaporation. Hot days provide more energy for faster evaporation. Wind carries away vapour, enhancing evaporation. High humidity slows evaporation.

61. Match the term from the water cycle in Column A with its correct description in Column B:

	Column A		**Column B**
1.	Water Cycle	A.	Water vapour turning into tiny water droplets to form clouds
2.	Precipitation	B.	Water falling from clouds as rain, hail, or snow
3.	Evaporation (in water cycle)	C.	Continuous circulation of water between Earth's surface and atmosphere
4.	Condensation (in water cycle)	D.	Water from oceans and lakes turning into water vapour due to Sun's heat

(a) 1-A, 2-D, 3-B, 4-C
(b) 1-C, 2-B, 3-D, 4-A
(c) 1-C, 2-D, 3-A, 4-B
(d) 1-B, 2-C, 3-D, 4-A

Ans :

(b) 1-C, 2-B, 3-D, 4-A
The water cycle is the continuous movement of water. Precipitation is water falling from clouds. Evaporation changes surface water to vapour. Condensation forms clouds from water vapour.

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62. Match the method of separation in Column A with the property of components it primarily utilizes in Column B:

	Column A		Column B
1.	Handpicking	A.	Difference in weight (heavier vs. lighter)
2.	Winnowing	B.	Difference in particle size
3.	Sieving	C.	Difference in magnetic properties
4.	Magnetic Separation	D.	Difference in size, colour, or shape (visible)

(a) 1-D, 2-A, 3-B, 4-C
(b) 1-A, 2-D, 3-C, 4-B
(c) 1-D, 2-C, 3-A, 4-B
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(a) 1-D, 2-A, 3-B, 4-C
Handpicking uses visible differences. Winnowing separates based on weight using wind. Sieving separates based on particle size using a mesh. Magnetic separation uses attraction to a magnet.

63. Match the separation technique in Column A with a common example of its use in Column B:

	Column A		Column B
1.	Threshing	A.	Separating tea leaves from prepared tea
2.	Evaporation	B.	Separating grains from stalks
3.	Filtration	C.	Obtaining salt from seawater
4.	Churning	D.	Separating butter from curd or buttermilk

(a) 1-C, 2-B, 3-D, 4-A
(b) 1-B, 2-D, 3-A, 4-C
(c) 1-D, 2-A, 3-C, 4-B
(d) 1-B, 2-C, 3-A, 4-D

Ans :

(d) 1-B, 2-C, 3-A, 4-D
Threshing separates grains from stalks. Evaporation is used to get salt from seawater. Filtration separates tea leaves using a strainer. Churning separates butter from curd/buttermilk.

64. Match the term related to separation of mixtures in Column A with its correct definition in Column B:

	Column A		Column B
1.	Sedimentation	A.	Pouring out clear liquid, leaving settled solids behind
2.	Decantation	B.	The clear liquid obtained after filtration
3.	Residue	C.	Heavier insoluble particles settling down in a liquid
4.	Filtrate	D.	Solid particles retained on the filter during filtration

(a) 1-A, 2-C, 3-D, 4-B
(b) 1-C, 2-D, 3-A, 4-B
(c) 1-C, 2-A, 3-D, 4-B
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(c) 1-C, 2-A, 3-D, 4-B
Sedimentation is settling of heavier particles. Decantation is pouring off the clear liquid. Residue is the solid left on the filter. Filtrate is the liquid passing through the filter.

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VERY SHORT QUESTION

65. What is the method of picking out small stones from grains by hand called?

Ans :

This method is called handpicking.

66. On what basis are particles separated during handpicking?

Ans :

Particles are separated based on differences in size, colour and shape.

67. What is the process of separating grains from stalks by beating them called?

Ans :

This process is known as threshing.

(iii) The finer sand particles pass through the holes of the wire mesh screen, while the larger pebbles and stones remain on top of the screen.

116. A person accidentally spills tea leaves into a cup of freshly brewed tea. They do not have a tea strainer available immediately. They decide to let the cup sit undisturbed for a few minutes.
(i) What will likely happen to the tea leaves if the cup is left undisturbed? Name this process.
(ii) What method can the person then use to pour out most of the clear tea, leaving the leaves behind?
(iii) Will this method completely remove all tea leaves? What could be used for better separation? (Evaluating)

Ans :

(i) The heavier tea leaves will likely settle down at the bottom of the cup. This process is called sedimentation.
(ii) The person can use decantation, carefully tilting the cup to pour the clear tea into another cup.
(iii) No, decantation might not remove all the tea leaves; some smaller ones might still be poured out. A tea strainer (filtration) would provide better separation.

117. To make cottage cheese (paneer) from sour milk, the milk is first curdled. The solid part (paneer) then needs to be separated from the liquid part (whey). A clean muslin cloth is often used for this.
(i) What method of separation is being used when the curdled milk is poured through the muslin cloth?
(ii) What is the role of the muslin cloth in this process?
(iii) What are the two components obtained after this separation process?

Ans :

(i) The method of separation being used is filtration.
(ii) The muslin cloth acts as a filter; its fine pores allow the liquid whey to pass through while retaining the solid paneer.
(iii) The two components obtained are solid cottage cheese (paneer) as the residue and liquid whey as the filtrate.

118. A recycling facility receives a large batch of mixed waste containing plastic bottles, iron cans, paper, and glass pieces. They use a large crane fitted with a powerful electromagnet.
(i) Which items from the mixed waste will be attracted by the electromagnet on the crane?
(ii) What is this method of separation called?
(iii) Why are the plastic bottles, paper, and glass pieces not picked up by the electromagnet?

Ans :

(i) The iron cans will be attracted by the electromagnet on the crane.
(ii) This method of separation is called magnetic separation.
(iii) Plastic bottles, paper, and glass are non-magnetic materials and are therefore not attracted to the electromagnet.

119. A street vendor sells roasted peanuts. After roasting, he rubs the peanuts to loosen their thin red skins. He then uses a traditional winnowing tray (soop) to separate the skins from the peanuts, especially on a slightly breezy day.
(i) What method is the vendor using to separate the peanut skins from the peanuts?
(ii) Why does this method work for separating peanut skins and peanuts?
(iii) Would this method be as effective in a completely closed room with no air movement? (Evaluating)

Ans :

(i) The vendor is using the method of winnowing.
(ii) This method works because the peanut skins are much lighter than the peanuts. The breeze carries away the light skins, while the heavier peanuts fall down.
(iii) No, this method would not be as effective in a closed room without air movement, as there would be no wind to blow away the lighter skins.

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SHORT ANSWER QUESTION

85. When is the handpicking method most convenient for separating substances?

Ans :

Handpicking is convenient when the particles to be removed are present in small quantities and are easily distinguishable by size, colour, or shape to be picked by hand.

86. Explain the process of threshing as traditionally done by farmers.

Ans :

Threshing involves farmers beating harvested stalks of crops, like wheat, on a hard surface, such as a wooden log, to separate the grains from the stalks.

87. How does winnowing help in separating husk from threshed wheat grains?

Ans :

In winnowing, a mixture of husk and grains is dropped from a height. The lighter husk is carried away by wind or blowing air, while the heavier grains fall down.

88. What is the principle behind using a sieve for separation? Give an example of its use.

Ans :

Sieving separates solid components of different sizes. Finer particles pass through the sieve's holes, while larger particles remain on it. Example: separating bran from flour.

89. How is evaporation used to obtain salt from seawater?

Ans :

Seawater, a solution of salt in water, is collected in shallow pits. Sunlight and air cause the water to evaporate, leaving behind solid salt.

90. Briefly describe the process of sedimentation.

Ans :

Sedimentation is the process where heavier, insoluble components in a liquid mixture settle down at the bottom of the container when left undisturbed for some time.

91. Briefly describe the process of decantation that follows sedimentation.

Ans :

After sedimentation, decantation is the gentle pouring out of the clear liquid from the top, leaving the settled solid impurities behind in the original container.

92. How can a mixture of oil and water be separated?

Ans :

Since oil and water do not mix and oil forms a separate layer (usually on top), they can be separated by decantation after allowing them to settle.

93. What is filtration? How does a tea strainer work as a filter?

Ans :

Filtration is separating insoluble solid components from a liquid using a filter. A tea strainer has small holes that allow liquid tea to pass through while retaining the solid tea leaves.

94. Why can a piece of cloth be used as a filter?

Ans :

A piece of cloth can be used as a filter because it has very small holes or pores between its woven threads that can trap solid particles.

95. Name two materials, other than filter paper and cloth, that can be used as filters.

Ans :

Cotton and sand (or charcoal) can be used as filters. The choice depends on the particle size to be removed.

96. Explain the process of churning to obtain butter from curd.

Ans :

Curd is vigorously agitated (churned) using a churner (mathni). This causes the lighter butter to separate and float on top, while the buttermilk is left behind.

97. How are magnets used by recyclers to separate materials from a heap of waste?

Ans :

Recyclers use strong magnets, often attached to cranes, to attract and separate iron articles (magnetic substances) from heaps of mixed waste materials.

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46. If you have a mixture of chalk powder and water, and you want to obtain clear water, which method would be most effective after allowing the chalk powder to settle?
(A) Churning the mixture vigorously.
(B) Adding more chalk powder.
(C) Carefully pouring off the clear water (decantation) or filtering the mixture.
(D) Heating the mixture to dissolve the chalk powder.

Ans :

(C) Carefully pouring off the clear water (decantation) or filtering the mixture.
Chalk powder is insoluble in water and will settle (sedimentation). After settling, the clear water can be separated by decantation or, for a cleaner separation, by filtration which will trap the chalk particles.

47. **Assertion (A) :** Common salt can be obtained from seawater by evaporation.
Reason (R) : Seawater contains dissolved salts, and when water evaporates, the salts are left behind as solids.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Seawater is a solution of various salts in water. The process of evaporation removes the water (as vapour), leaving the dissolved salts to crystallize and remain as a solid residue.

48. Which of the following are true about separating mixtures?
1. Handpicking is suitable when components have visible differences in size or color.
2. Winnowing uses differences in magnetic properties.
3. Sieving separates substances based on their solubility.

(A) 1 only
(B) 2 only
(C) 1 and 3 only
(D) 2 and 3 only

Ans :

(A) 1 only
Handpicking relies on visible differences. Winnowing uses differences in weight and the effect of wind. Sieving separates based on particle size, not solubility. Therefore, only statement 1 is correct.

49. A chef accidentally spills some iron filings into a container of sugar.
Which method of separation would be quickest and most effective?
(A) Dissolving the sugar in water and filtering out the iron filings.
(B) Using a magnet to attract and remove the iron filings.
(C) Carefully handpicking each iron filing.
(D) Sieving the mixture through a fine mesh.

Ans :

(B) Using a magnet to attract and remove the iron filings.
Iron filings are magnetic, while sugar is not. A magnet can easily attract and lift the iron filings out of the sugar, providing a quick and clean separation.

50. When a salt solution in a china dish is heated until all water boils away, what is observed in the china dish after it cools down?
(A) The china dish is empty.
(B) A layer of black carbon.
(C) Solid salt is left behind.
(D) A clear, odorless liquid.

Ans :

(C) Solid salt is left behind.
When the water in a salt solution is completely evaporated by heating, the dissolved salt, which does not evaporate, remains in the dish as a solid residue.

51. Why is a filter paper generally more effective than a piece of cloth for filtering very fine mud particles from water?
(A) Filter paper is thicker and stronger than cloth.
(B) Filter paper has much finer pores than the weave of a cloth.
(C) Filter paper actively absorbs mud particles.
(D) Cloth tends to dissolve in muddy water.

Ans :

(B) Filter paper has much finer pores than the weave of a cloth.

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Evaporation involves heating a solution so the liquid turns into vapour, leaving the dissolved solid behind. For salt from seawater, seawater is collected in shallow pits. The sun's heat evaporates the water over days, and the solid salt remains. This salt is then collected and purified further.

109. Compare and contrast handpicking and sieving as methods of separation. Give one situation where each method is most suitable. (Evaluating)

Ans :

Both separate solids from solids. Handpicking relies on visible differences (size, colour, shape) and is suitable for removing small quantities of larger, distinct impurities (e.g., stones from rice). Sieving separates based purely on particle size difference using a mesh; suitable for separating finer particles from coarser ones (e.g., flour from bran).

110. Imagine you have a mixture of sand, salt, and iron filings. Outline a sequence of methods you would use to separate these three components.

Ans :

First, use magnetic separation: pass a magnet over the mixture to remove the iron filings. Second, add water to the remaining sand and salt mixture to dissolve the salt. Third, use decantation (after sedimentation) or filtration to separate the insoluble sand from the salt solution. Finally, use evaporation to recover the salt from the water.

111. What is churning? Explain how this process is used in households to obtain butter. What property of butter allows it to be separated this way?

Ans :

Churning is the vigorous agitation of a liquid, typically curd or cream. In households, curd is churned using a mathni (churner). This process causes the fat particles (butter) to clump together. Butter, being lighter than buttermilk, floats on top and can be skimmed off.

112. Threshing machines perform both the tasks of threshing and winnowing simultaneously. Explain how this is beneficial for farmers.

Ans :

This is beneficial as it combines two laborious and time-consuming processes into one, increasing efficiency. Farmers can separate grains from stalks and husk much faster, reducing manual effort, saving time, and potentially leading to quicker processing of the harvested crop and reduced crop loss.

113. Why is it important to separate components from a mixture? Give at least two distinct reasons with examples.

Ans :

1. To remove unwanted or harmful components : For example, separating small stones from rice before cooking makes the rice safe and pleasant to eat.
2. To obtain useful substances : For example, separating petrol, diesel, and kerosene from crude oil allows each to be used for its specific purpose.

114. When preparing meethi puri, Valli's Mami sieved the wheat flour. What was she trying to remove, and why is this step important before kneading the flour?

Ans :

Valli's Mami was trying to remove bran and any small impurities or coarse particles that might be present in the wheat flour. This step is important to ensure the flour is fine and clean, resulting in a smoother texture for the meethi puri and removing any undesirable elements.

CASE BASED QUESTION

115. At a construction site, workers need to separate pebbles and small stones from sand before mixing cement. They have a large wire mesh screen mounted on a frame. They shovel the mixture of sand, pebbles, and stones onto the screen.

(i) What method of separation are the workers using?

(ii) What property of sand, pebbles, and stones allows this separation method to work?

(iii) What happens to the sand, and what happens to the pebbles and stones during this process?

Ans :

(i) The workers are using the method of sieving.

(ii) The different sizes of the particles (sand being fine, pebbles and stones being coarser) allow this method to work.

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68. Name the traditional tool, often made of bamboo, used for winnowing.

Ans :

A soop (bamboo tray) is used for winnowing.

69. What principle is used in winnowing to separate husk from grains?

Ans :

Winnowing separates heavier components from lighter components using wind or blowing air.

70. What are modern machines called that perform both threshing and winnowing?

Ans :

These machines are called threshers.

71. What is the purpose of using a sieve when preparing flour?

Ans :

A sieve is used to remove bran or small stones from the flour.

72. Sieving is used when components of a mixture have different what?

Ans :

Sieving is used when components of a solid-solid mixture have different sizes.

73. How is common salt traditionally obtained from seawater?

Ans :

Seawater is kept in shallow pits; water evaporates leaving behind solid salt.

74. What is the term for a liquid in which a solid has dissolved to form a mixture?

Ans :

It is called a solution.

75. In Ayurveda, how are herbs or plant parts often prepared to remove excess water?

Ans :

They are often dried in the shade, which facilitates evaporation of excess water.

76. What is the process of settling down of heavier insoluble components at the bottom of a liquid called?

Ans :

This process is called sedimentation.

77. What is the process of removing the clear liquid above settled impurities by tilting the vessel called?

Ans :

This process is called decantation.

78. Name the method used to separate tea leaves from prepared tea using a tea-strainer.

Ans :

This method is called filtration.

79. What material, having very fine pores, is mentioned as a filter besides cloth?

Ans :

Filter paper is mentioned as a filter with very fine pores.

80. What is the solid material left on the filter paper after filtration called?

Ans :

The solid material left on the filter paper is called residue.

81. What is the clear liquid obtained after filtering muddy water called?

Ans :

The clear liquid obtained is called filtrate.

82. What method is used to separate butter from curd using a mathni (churner)?

Ans :

The method used is churning.

83. What property of iron allows it to be separated from sawdust using a magnet?

Ans :

Iron is a magnetic substance, meaning it is attracted to a magnet.

84. What is the separation of magnetic and non-magnetic substances using a magnet called?

Ans :

This method is called magnetic separation.

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CHAPTER 10

LIVING CREATURES : EXPLORING THEIR CHARACTERISTICS

1. WHAT SETS THE LIVING APART FROM THE NON-LIVING?

Starts with a discussion triggered by observing a snail shell, leading to the question of how to differentiate between living and non-living things.

1.1 Characteristics of Living Beings

The common characteristics shared by living beings that distinguish them from non-living things:

1. Movement : Living beings often show movement. Animals move from place to place. Plants show movement like opening flowers, trapping insects (e.g., Drosera), or climbing. Non-living things like cars also move, but not on their own in the same way living beings do.
2. Growth : Living beings grow over time (e.g., children grow taller, plants grow). Non-living things do not grow.
3. Need for Food (Nutrition) : Living beings require food for growth and energy.
4. Respiration : All living beings respire (breathe). Animals inhale and exhale air. Plants exchange gases through tiny pores called stomata on leaves.
5. Excretion : Living beings remove waste products from their bodies (e.g., sweat, urine in animals; excess water/minerals as droplets on leaves in plants).
6. Response to Stimuli : Living beings react to changes in their environment (stimuli). Examples include humans reacting to touching hot objects or stepping on thorns; plants like touch-me-not folding leaves upon touch, or other plants folding leaves at sunset.
7. Reproduction : Living beings produce new individuals of their own kind, ensuring the continuity of life.
8. Death : Living beings eventually die when they can no longer exhibit these characteristics, even with necessary resources available.

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2. ESSENTIAL CONDITIONS FOR GERMINATION OF A SEED

1. Seed as Living/Non-living : Raises the question of how to classify a seed. Germination reveals its living nature.
2. Essential Conditions : The experiment concludes that the right amount of water and air are essential for bean seed germination. Sunlight is not essential for the germination itself (seeds in Pot C germinate), but is needed for the seedling's later growth.
   (i) Water : Softens the seed coat and enables processes for growth.
   (ii) Air : Needed for respiration; obtained from spaces between soil particles. Excess water (Pot B) blocks air, hindering germination.
3. Light/Darkness : While bean seeds don't need light, some seeds (e.g., Coleus, Petunia) require light, while others (e.g., Calendula, Zinnia) require darkness.

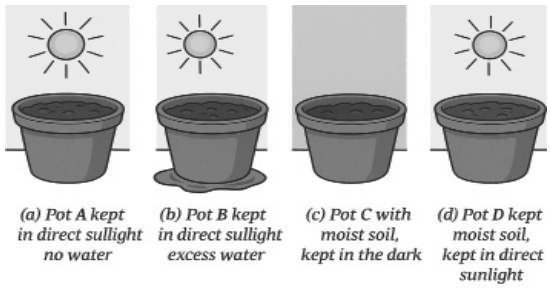
(a) Pot A kept in direct sullight no water
(b) Pot B kept in direct sullight excess water
(c) Pot C with moist soil, kept in the dark
(d) Pot D kept moist soil, kept in direct sunlight

Figure : Bean seeds exposed to different conditions

3. GROWTH AND MOVEMENT IN PLANTS

1. Roots consistently grow downwards (towards gravity).
2. Shoots consistently grow upwards (away from gravity) and towards sunlight. In case (C), the shoot bends towards the light source.
3. Conclusion : Plants exhibit growth and movement in response to stimuli like gravity and light.

Pot with bean seeds	Availability Air	Availability Sunlight	Availability Water	Possible Seed germination Prediction	Observation	Possible reason for the observation
A: In direct sunlight and without water	Yes	Yes	No			
B: In direct sunlight and excess water	Limited/No	Yes	Yes (Excess)			
C: In complete dark and moist soil	Yes	No	Yes (Moderate)			
D: In direct sunlight and moist soil	Yes	Yes	Yes (Moderate)			

Ans :

Pot with bean seeds	Availability Air	Availability Sunlight	Availability Water	Possible Seed germination Prediction	Observation (Expected Results)	Possible reason for the observation
A: In direct sunlight and without water	Yes	Yes	No	No	No germination	Water is essential for germination. Without water, the seed coat won't soften and the embryo can't activate.
B: In direct sunlight and excess water	Limited/No	Yes	Yes (Excess)	No	No germination	Excess water fills all air spaces in the soil, preventing the seeds from getting enough air, which is necessary for respiration during germination.
C: In complete dark and moist soil	Yes	No	Yes (Moderate)	Yes	Germination	Light is generally not essential for the germination of most seeds like beans. Sufficient air and water are present.
D: In direct sunlight and moist soil	Yes	Yes	Yes (Moderate)	Yes	Germination	All essential conditions (air and water) are met for germination. Light is not an inhibitor for bean seeds.

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NCERT ACTIVITY

Activity 10.1 : Let us record

We are surrounded by numerous things. Just look around in your classroom and you may find many examples-the pencil that you are holding, the book that you are reading or the pigeon near the window.

1. List them in Table and identify each of them as living or non-living on the basis of your understanding in column II.
2. Write a reason for grouping them as living or non living in column III.

Table : Living beings and non-living things in our surroundings

(I) Name	(II) My guess (Living/ Non-living)	(III) Remarks
Pencil	Non-living	
Book		
Pigeon	Living	
Car		
Plant		
Any other		

Ans :

(I) Name	(II) My guess (Living/ Non-living)	(III) Remarks (Common Class 6 Understanding)
Pencil	Non-living	Does not move on its own, does not grow, does not need food.
Book	Non-living	Does not move, grow, breathe, or eat.
Pigeon	Living	Moves, eats, grows, breathes, makes sounds.
Car	Non-living	Moves, but needs fuel to move, does not grow or reproduce on its own.
Plant	Living	Grows, needs water/ sunlight (food), can move parts like leaves, reproduces (seeds).
Your Friend	Living	Moves, eats, grows, breathes, responds, reproduces.
Table	Non-living	Does not move, grow, breathe, or eat.

Activity 10.2 : Let us experiment

1. Take four identical pots filled with garden soil. Sow four bean seeds in each pot. Now, keep these pots in the following conditions for 15 days.
   (i) Pot A: Do not water the soil. Place this pot in direct sunlight.

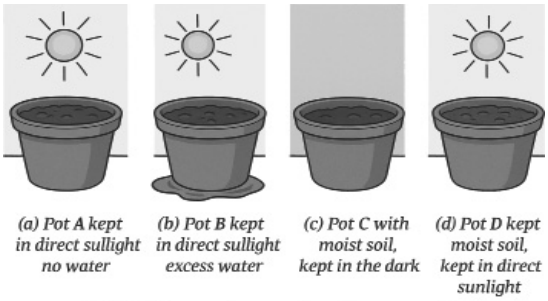
(a) Pot A kept in direct sullight no water
(b) Pot B kept in direct sullight excess water
(c) Pot C with moist soil, kept in the dark
(d) Pot D kept moist soil, kept in direct sunlight

Figure : Bean seeds exposed to different conditions

   (ii) Pot B: Add excess water to the soil such that water is always present above the soil. Keep adding water on a regular basis if water reduces. Place this pot in direct sunlight.
   (iii) Pot C: Keep the soil in this pot slightly moist by adding a moderate amount of water on a regular basis. Place this pot in a dark location.
   (iv) Pot D: Maintain the soil in this pot slightly moist by adding a moderate amount of water on a regular basis. Place this pot in direct sunlight.
2. Indicate the availability of air, sunlight and water for the seeds in each of these cases in Table.
3. When a seed turns into a sprout, it is said to have germinated. Predict whether the seeds in each pot will germinate. Record your predictions for each pot kept under different conditions in Table.

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Table : Effect of certain conditions on seed germination

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(C) Non-living things can reproduce, but living beings cannot.
(D) Only living beings are made of complex materials.

Ans :

(B) Living beings can move, need food, grow, respire, excrete, respond, reproduce, and die.
The outlines several key characteristics common to living beings, including movement, nutrition, growth, respiration, excretion, response to stimuli, reproduction and eventually, death, which differentiate them from non-living things.

2. In the story, what did Avadhi's mother explain about the shell Avadhi tried to pick up?
(A) That it was just an empty, non-living object.
(B) That the shell could be home to a living snail and is part of its body.
(C) That shells are too delicate to be touched.
(D) That the shell was a rare type of rock formation.

Ans :

(B) That the shell could be home to a living snail and is part of its body.
Avadhi's mother advised her not to pick up the shell because it could contain a living snail and that the shell itself is actually a part of the snail's body.

3. Why is a car, despite being able to move, generally classified as non-living?
(A) Because it does not consume fuel to move.
(B) Because it cannot move on its own without a driver or engine.
(C) Because it does not exhibit other characteristics of living beings like growth, reproduction, or respiration.
(D) Because it is made of metal and plastic.

Ans :

(C) Because it does not exhibit other characteristics of living beings like growth, reproduction, or respiration.
While a car can move, it lacks other fundamental characteristics of life such as growth from within, the ability to reproduce, respiration, and response to stimuli in a biological sense.

4. What is a stimulus in the context of living beings?
(A) The food that a living being consumes for energy.
(B) Any thing or event that prompts a living being to respond.
(C) The process of breathing in air.
(D) The growth of a plant towards sunlight.

Ans :

(B) Any thing or event that prompts a living being to respond.
A stimulus is any change or event in the internal or external environment that can elicit a reaction or response from a living organism. Examples include light, sound, touch or temperature changes.

5. Which plant is mentioned as an example that folds its leaves when touched?
(A) Rose plant
(B) Mango tree
(C) Touch-me-not (mimosa, chhui-mui)
(D) Grass

Ans :

(C) Touch-me-not (mimosa, chhui-mui)
The chapter provides the touch-me-not plant (also known by its various local names) as an example of a plant that responds to the stimulus of touch by folding its leaves.

6. What is the primary purpose of reproduction in living beings?
(A) To allow individual organisms to grow larger.
(B) To ensure the continuity of life for that species.
(C) To help organisms respond to their environment.
(D) To provide food for other organisms.

Ans :

(B) To ensure the continuity of life for that species.
Reproduction is the biological process by which new individual organisms – offspring – are produced from their parent or parents. This process is essential for the continuation and survival of a species across generations.

7. What is excretion in living beings?
(A) The process of taking in food for energy.
(B) The process of breathing to obtain oxygen.
(C) The removal of waste products from the body.
(D) The movement of an organism from one place to another.

Ans :

(C) The removal of waste products from the body.
Excretion is a vital biological process where metabolic waste products and other non-useful

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Activity 10.3 : Let us design

1. Take some bean or gram seeds and allow them to germinate on a moist cloth or a moist tissue paper.
2. Let them germinate until each of them develop into a seedling having a small root and a small shoot.
3. Now, take three glass beakers or tumblers, and label them as A, B and C.
4. Take three glass plates and attach a thick blotting paper to one side of each plate using a thick soft cotton thread.
5. Fix one seedling on each plate using a thick soft cotton thread, as shown in Figure, ensuring that the plant is not damaged.
6. Now, place one glass plate upright with a seedling attached into each of the beaker A and beaker C, as shown in Figure a and Figure (c).
7. In beaker B, arrange the plate such that the shoot of a seedling is directed downwards and the root is directed upwards, as shown in Figure (b).

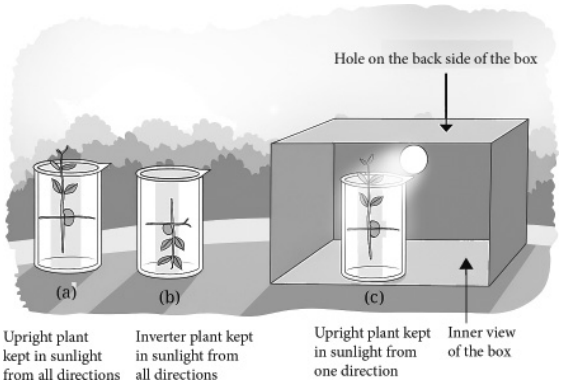
Hole on the back side of the box
(a)
(b)
(c)
Upright plant kept in sunlight from all directions
Inverter plant kept in sunlight from all directions
Upright plant kept in sunlight from one direction
Inner view of the box

Figure : Set-up showing plants kept in different conditions

8. Pour water into all the three beakers to ensure that the seedling in each beaker remains above the water level.
9. In each case, let the bottom of the blotting paper get completely wet by soaking in the water. In this way, the seedling will get the moisture from the wet blotting paper.
10. Place beaker A and beaker B in sunlight as shown in Figure (a) and Figure (b).
11. Position beaker C as shown in Figure (c). Place a cardboard box in such a way that the seedling gets light from one direction only through a small circular hole.
12. Fill Table with your predictions and observations.

Table : Growth of root and shoot under different conditions

Beakers	Direction of sunlight	Direction of plant	Direction of growth of root and shoot		
			shoot /root	Predic-tions	Observa-tions
A	All directions	Upright	Shoot		
			Root		
B	All directions	Inverted	Shoot		
			Root		
C	Only from one direction	Upright	Shoot		
			Root		

Ans :

Beakers	Direction of sunlight	Direction of plant	Direction of growth of root and shoot		
			shoot/ root	Predictions	Observations
A	All directions	Upright	Shoot	Grows upwards	Grows upwards, away from the ground.
			Root	Grows downwards	Grows downwards, towards the ground.
B	All directions	Inverted	Shoot	Bends and grows upwards	Bends and grows upwards, against gravity.
			Root	Bends and grows downwards	Bends and grows downwards, towards gravity.
C	Only from one direction	Upright	Shoot	Grows towards the light	Grows towards the small hole where light comes from.
			Root	Grows downwards	Continues to grow downwards, irrespective of light direction.

Activity 10.4 : Let us explore

1. Plant a bean seed and provide suitable conditions for its growth. Observe regularly for three months
2. Record your observations in Table as and when changes become visible.
3. Note the date when any change is observed. Record answers for the following questions-
   (i) How long does it take for any change to occur?
   (ii) After how many days does the first flower appear?
   (iii) After some parts of the flower have dried, can you see any further growth?

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Ans :

(C) The shoot bends and grows upwards; the root bends and grows downwards.
Plants exhibit tropisms. Shoots typically grow upwards (against gravity and often towards light), and roots grow downwards (with gravity). Even if inverted, they will reorient their growth accordingly.

15. Which Indian scientist built a machine called a crescograph to record how plants respond to stimuli?
(A) C.V. Raman
(B) Homi J. Bhabha
(C) Jagadish Chandra Bose
(D) Salim Ali

Ans :

(C) Jagadish Chandra Bose
Jagadish Chandra Bose as the Indian scientist who invented the crescograph. This instrument was used to measure plant growth and their responses to various external stimuli.

16. What is the life cycle of a plant, as described with the bean plant example?
(A) The daily process of photosynthesis.
(B) The period from when a flower blooms to when it wilts.
(C) The entire process from a seed to a mature plant producing new seeds.
(D) The way a plant's leaves change color in different seasons.

Ans :

(C) The entire process from a seed to a mature plant producing new seeds.
The life cycle of a plant encompasses all the stages of its development, starting from a seed, growing into a seedling, maturing into an adult plant, flowering, producing fruits and new seeds, thereby enabling the next generation.

17. A student plants a bean seed. After several weeks, the plant produces flowers, which then develop into pods containing new bean seeds. The original plant eventually becomes yellow and dry.
This entire sequence represents:
(A) Only the germination phase.
(B) A part of the plant's response to stimuli.
(C) The complete life cycle of the bean plant.
(D) An example of asexual reproduction.

Ans :

(C) The complete life cycle of the bean plant.
The scenario describes the key stages from seed to germination, growth, flowering, fruit (pod) formation with new seeds, and finally the death of the parent plant, which constitutes a full life cycle.

18. What are the worm-like creatures found in stagnant water, which are distinct life stages of a mosquito, called?
(A) Caterpillars and cocoons
(B) Tadpoles and froglets
(C) Larva and pupa
(D) Nymphs and adults

Ans :

(C) Larva and pupa
The chapter identifies larva and pupa as two different worm-like developmental stages of a mosquito that are commonly found in stagnant water bodies.

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19. Why are people advised not to allow water to stagnate in their surroundings, in relation to mosquitoes?
(A) Stagnant water evaporates too quickly.
(B) Stagnant water is a breeding ground for mosquitoes, where they lay eggs.
(C) Stagnant water attracts birds that eat mosquitoes.
(D) Stagnant water damages the foundations of houses.

Ans :

(B) Stagnant water is a breeding ground for mosquitoes, where they lay eggs.
Mosquitoes lay their eggs in or near stagnant water. Allowing water to collect and remain still provides an ideal environment for mosquito larvae and pupae to develop, increasing the mosquito population.

20. What is a key difference between the larval stage and the pupal stage of a mosquito, as often observed?
(A) Larvae can fly, while pupae cannot.
(B) Larvae are found on land, while pupae are in water.
(C) They have different shapes and appearances, with pupae often being more comma-shaped.
(D) Larvae eat plants, while pupae are predatory.

Ans :

(C) They have different shapes and appearances, with pupae often being more comma-shaped.

Now, suppose you are given a container filled with water from a puddle which contains larvae and pupae. Without separating them from the container, how would you design an activity to decide which stage, out of the two, gives way to the next?

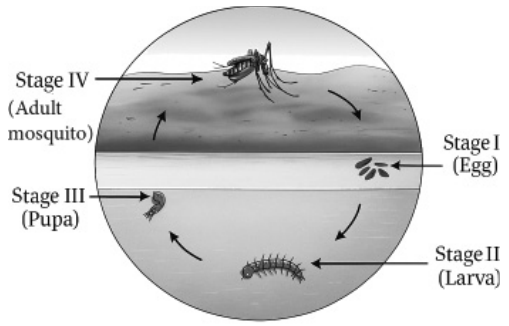

Figure : Life cycle of a mosquito

Ans :

From these observations, you can conclude the correct sequence:
Egg → Larva → Pupa → Adult
This means larva comes immediately after the egg, followed by the pupa stage, and then the adult mosquito.

Activity 10.6 : Let us analyse

Avadhi and Aayush are dressed up in full sleeves shirts and full pants today. It has been raining intermittently for a week. They are going out with their classmates for an activity. After a brief walk led by their science teacher, they reach a shallow pond. It is surrounded by trees and tall grasses. The teacher cautions them to watch everything from a distance without causing any disturbance. You may also go to a small water body during the rainy season with a facilitator and explore it by taking due safety precautions.
You may notice a white jelly-like substance on the surface of water towards the edge of the pond (Figure). This may also be attached to plants growing in or around the water. This jelly-like substance is actually a cluster of eggs of a frog and is known as spawn.
Observe the features of all the stages of a frog shown in figure . How will you decide the sequence of the given stages (A, B, C, D, E, F)? Some of the stages show distinct changes in their initial and final shapes. Record these changes in Table.

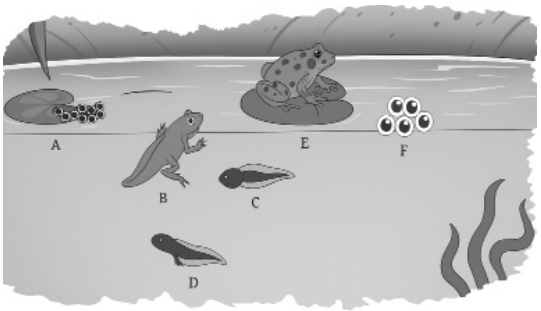

Figure : Different stages of a frog in a pond

Table : Changes in different life stages of a frog

A	B	C	D	E	F
			It is similar to 'C' but it has two legs.		

Ans :

A	B	C	D	E	F
A part of the jelly-like spawn containing black dots (eggs)	A froglet with four legs and a short tail	A young tadpole with long tail and no legs	It is similar to 'C' but it has two legs.	A fully grown adult frog with no tail	A jelly-like cluster of frog eggs called spawn

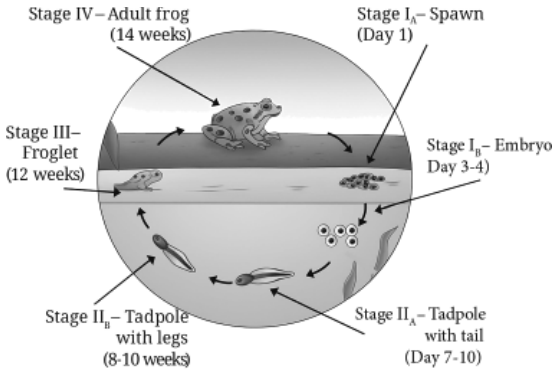

Figure : Life cycle of a frog

MULTIPLE CHOICE QUESTION

1. Which of the following best describes the characteristics that set living beings apart from non-living things, as discussed ?
(A) Living beings are always larger than non-living things.
(B) Living beings can move, need food, grow, respire, excrete, respond, reproduce, and die.

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(iv) Which structure do the remaining parts of flower develop into?
(v) Can you notice a pod or a fruit with seeds develop from a flower?
(vi) What happens to the plant after the fruits containing seeds are formed?

Table : Changes observed during the growth of the plant

Date	Observations	Sketches
	Seeds are sown	

Ans :

Date	Observations	Sketches (Conceptual descriptions)
Day 1	Seeds are sown.	Small, oval bean seed.
Day 3-5	Seed swells, root emerges.	Seed with a tiny white root pointing down.
Day 6-8	Shoot emerges, tiny leaves appear.	Root growing down, small green shoot with two tiny leaves pointing up.
Day 10-15	Plant grows taller, more leaves develop.	Taller plant with several green leaves on a thin stem.
Day 20-30	Stem thickens, plant gets bushier.	Stronger stem, more branches and leaves.
Day 40-50	Flower buds appear.	Plant with small, unopened flower buds.
Day 50-60	First flowers bloom.	Plant with open flowers.
Day 65-75	Flowers dry and pods (fruits) start to form.	Dried flowers, tiny green pods appearing where flowers were.
Day 80-90	Pods grow larger, seeds develop inside.	Large green pods on the plant.
Day 90+	Plant starts to turn yellow, pods mature and dry.	Plant showing signs of yellowing leaves, dry pods.
Day 100-110	Plant dries out and dies after seeds are fully formed.	Dried, shriveled plant with mature, dry pods.

(i) The first changes (swelling of seed, emergence of root) can occur within 3 to 5 days, depending on the conditions.
(ii) The first flower typically appears around 40-60 days after sowing the seed.
(iii) Yes, after the flower dries, the ovary part of the flower starts to grow and swell. This is where the fruit (pod) will form.
(iv) The remaining parts of the flower (specifically the ovary) develop into the fruit (in this case, the bean pod).
(v) Yes, a green pod (fruit) will develop from the flower, and if you open it later, you will find new bean seeds inside.
(vi) After the fruits (pods) with mature seeds are formed, the bean plant usually completes its life cycle. It will start to turn yellow, dry out, and eventually die. This is because its main purpose, which is to produce new seeds for the next generation, has been fulfilled.

Activity 10.5 : Let us analyse

Let us solve an interesting puzzle.
How will you decide which stage (larva or pupa) comes immediately after the egg stage?
Suppose you are given a container with water from a puddle containing larvae and pupae. Design an activity to find out the correct sequence of these stages.
You can take help of the following activity designed by Avadhi to create your own activity-
Step 1: I have a water container with mosquito larvae and pupae.
Step 2: I will separate 4-5 larvae and pupae into two separate containers with the same water.
Step 3: I will observe them every day until I see them changing to the next stage.
Step 4: If the larvae change into pupae, it would mean that the larval stage comes before the pupal stage or vice-versa.
Step 5: I will keep watching both the containers to see in which one a mosquito appears first.
These observations will help us to learn the correct sequence of growth.

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materials are eliminated from an organism's body to maintain internal balance.

8. What are the tiny pores on the surface of leaves that help plants in taking air in and out called?
(A) Roots
(B) Stems
(C) Stomata
(D) Petals

Ans :

(C) Stomata
Stomata are small pores, typically found on the surface of leaves (and sometimes stems), which facilitate gas exchange (like intake of carbon dioxide and release of oxygen and water vapour) in plants.

9. How does the movement of most plants differ from the movement of most animals?
(A) Plants cannot move at all, while animals can move freely.
(B) Plants generally do not move from one place to another, but show movements like opening of flowers; animals can move from place to place.
(C) Animals show growth movements, while plants move for food.
(D) Both plants and animals move from place to place in search of sunlight.

Ans :

(B) Plants generally do not move from one place to another, but show movements like opening of flowers; animals can move from place to place.
Most animals exhibit locomotion (moving from one location to another). Plants are typically rooted but show other types of movements, such as flowers opening/closing or growth towards light.

10. If a bean seed is sown in a pot with moist soil and kept in direct sunlight, and another is kept in complete darkness with moist soil, which condition is primarily being tested for its effect on germination in this comparison?
(A) The need for soil.
(B) The need for air.
(C) The need for sunlight for germination.
(D) The need for water for germination.

Ans :

(C) The need for sunlight for germination.
By keeping all other conditions (soil, moisture, likely air) similar and varying only the presence or absence of light, this setup is designed to investigate whether sunlight is an essential condition for the initial process of seed germination.

11. What are the essential conditions identified for the germination of bean seeds?
(A) Only sunlight and air.
(B) Only water and soil.
(C) The right amount of water and air.
(D) Only darkness and warmth.

Ans :

(C) The right amount of water and air.
The bean seeds require both adequate water (not too much or too little) and air for successful germination. Sunlight is found not to be essential for the germination itself.

12. What is the outer covering of a seed called?
(A) Embryo
(B) Cotyledon
(C) Seed coat
(D) Root cap

Ans :

(C) Seed coat
The seed coat is the protective outermost layer of a seed. It helps to shield the inner embryo and stored food from damage and harsh environmental conditions.

13. What does it mean when a seed germinates?
(A) It produces flowers.
(B) It develops into a fruit.
(C) It turns into a sprout, beginning its growth into a plant.
(D) It becomes dry and dormant.

Ans :

(C) It turns into a sprout, beginning its growth into a plant.
Germination is the process by which a seed begins to grow and develop into a seedling or young plant, typically marked by the emergence of a sprout.

14. When a plant seedling is kept inverted (shoot downwards, root upwards) in sunlight, how do the shoot and root generally grow?
(A) The shoot grows downwards, and the root grows upwards.
(B) Both the shoot and root grow sideways.
(C) The shoot bends and grows upwards; the root bends and grows downwards.
(D) The plant stops growing in this position.

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4. Jagadish Chandra Bose : Indian scientist who demonstrated that plants respond to stimuli using his invention, the crescograph.

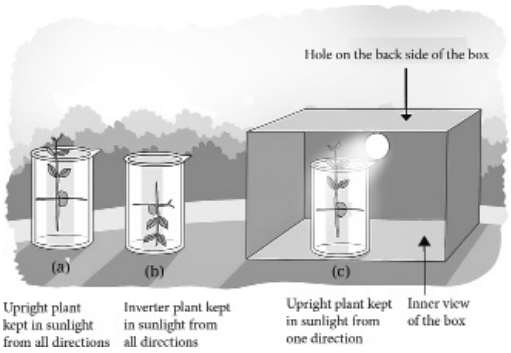
Hole on the back side of the box
(a)
(b)
(c)
Upright plant kept in sunlight from all directions
Inverter plant kept in sunlight from all directions
Upright plant kept in sunlight from one direction
Inner view of the box

Figure : Set-up showing plants kept in different conditions

4. LIFE CYCLE OF A PLANT

1. Life Cycle Defined : The entire process from a seed germinating into a plant, maturing, producing flowers and fruits/seeds, and those seeds potentially growing into the next generation. The parent plant eventually dies.
2. Bean Plant Example : Illustrates the stages : Seed → Germination → Appearance of leaves → Appearance of flowers → Appearance of fruit (pod with seeds) → Death of plant.

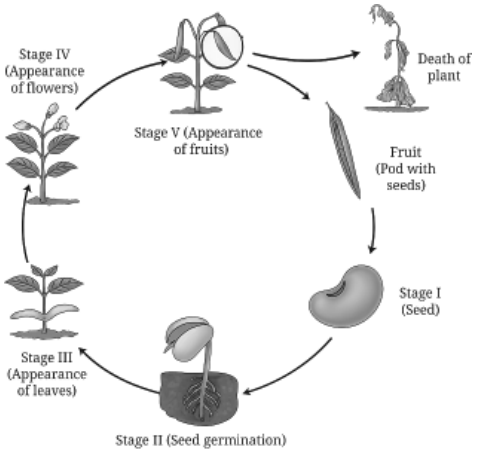
Stage IV (Appearance of flowers)
Stage V (Appearance of fruits)
Death of plant
Fruit (Pod with seeds)
Stage I (Seed)
Stage II (Seed germination)
Stage III (Appearance of leaves)

Figure : Life cycle of a bean plant

5. LIFE CYCLE OF ANIMALS

Animals, like plants, go through changes during their life cycle.

5.1 Life cycle of a Mosquito

1. **Importance :** Mosquitoes transmit diseases; preventing stagnant water disrupts their breeding.
2. **Observation :** Larvae and pupae (worm-like stages) are found in stagnant water. They need air and come to the surface to respire.
3. **Disruption :** Spraying kerosene oil on water forms a layer that prevents larvae/pupae from breathing, thus killing them.
4. **Stages :** Egg → Larva → Pupa → Adult. Each stage looks significantly different. The adult emerges from the pupa.

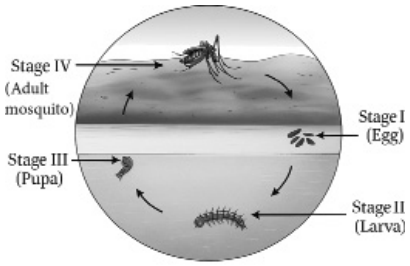

Figure : Life cycle of a mosquito

5.2 Life cycle of a Frog

1. Stages : Spawn (cluster of eggs) → Embryo v Tadpole (early stage with tail, no legs; later stage with hind legs and tail) → Frog let (looks like a small frog, still has tail stub, starts spending time on land) → Adult Frog (lives on land and water, no tail, strong legs).
2. Habitat Change : The life cycle involves a transition from aquatic (egg, tadpole) to semi-aquatic/terrestrial (frog let, adult) life.
3. General Conclusion : Plants and animals undergo unique life cycles with significant changes, essential for survival and continuity. Protecting their habitats is important.

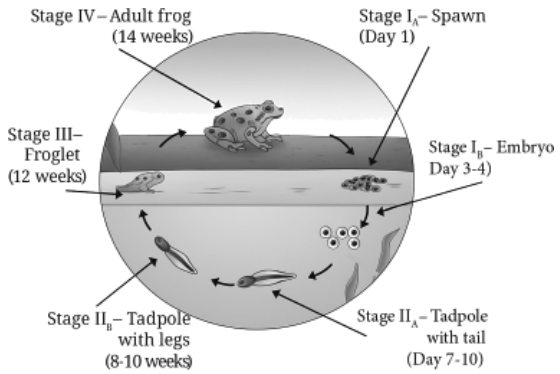
Stage IV – Adult frog (14 weeks)
Stage I_A – Spawn (Day 1)
Stage III – Froglet (12 weeks)
Stage I_B – Embryo Day 3-4)
Stage II_B – Tadpole with legs (8-10 weeks)
Stage II_A – Tadpole with tail (Day 7-10)

Figure : Life cycle of a frog

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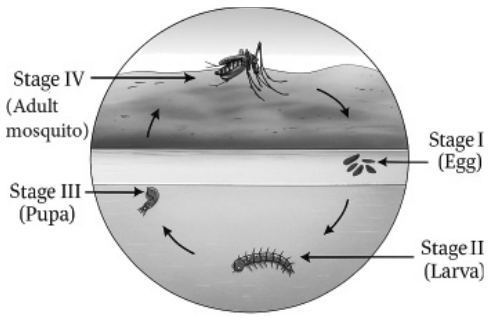
The mosquito larva and pupa are visually distinct stages. Larvae are typically elongated and worm-like, while pupae are often more compact and comma-shaped, representing a transformation phase before emerging as an adult.

21. Which of the following is NOT one of the four main stages in the life cycle of a mosquito as described in Figure ?



(A) Egg
(B) Nymph
(C) Larva
(D) Pupa

Ans :

(B) Nymph
The mosquito life cycle shown consists of four stages: egg, larva, pupa, and adult. The term nymph is typically used for incomplete metamorphosis in insects like grasshoppers, not mosquitoes.

22. **Assertion (A) :** Spreading kerosene oil on stagnant water can help control mosquito breeding.
Reason (R) : Kerosene oil forms a thin layer that prevents larvae and pupae from inhaling air, causing them to die.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Mosquito larvae and pupae need to come to the water surface to breathe air. A layer of kerosene oil on the water surface blocks their access to air, leading to their suffocation and death, thus disrupting the mosquito life cycle.

23. Which of the following characteristics are generally exhibited by living beings?
1. They grow.
2. They reproduce.
3. They do not respond to stimuli.
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(A) 1 and 2 only
Growth and reproduction are fundamental characteristics of living beings. Responding to stimuli is also a key characteristic; not responding would indicate a lack of life or a non-living entity.

24. A gardener notices that the bean seeds sown in a waterlogged pot (excess water) have not germinated well, while those in a pot with moist soil have sprouted.
The poor germination in the waterlogged pot is likely because:
(A) The seeds did not receive enough sunlight.
(B) The seeds lacked sufficient air due to excess water.
(C) The seeds were too old to germinate.
(D) The soil in the waterlogged pot was infertile.

Ans :

(B) The seeds lacked sufficient air due to excess water.
Seeds require air (oxygen) for respiration during germination. Excess water in the soil fills up air spaces, depriving the seeds of the necessary oxygen, which can inhibit or prevent germination.

25. What is the cluster of frog eggs, often found as a jelly-like substance in water, known as?
(A) Larva
(B) Pupa
(C) Spawn
(D) Froglet

Ans :

(C) Spawn
The jelly-like mass of frog eggs found in or near water as spawn. This is the initial stage of the frog's life cycle.

26. Why do tadpoles (early stage of a frog) have tails?
(A) To help them breathe underwater.
(B) To help them swim in water.
(C) To attract mates.
(D) To store food.

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Ans :

(B) To help them swim in water.
Tadpoles are the aquatic larval stage of frogs. Their tails are adapted for propulsion, enabling them to swim effectively in their water habitat before they develop legs and lose their tails.

27. What is a frog let in the life cycle of a frog?
(A) The adult frog ready to lay eggs.
(B) The earliest egg stage of a frog.
(C) A young frog that still has a tail but has developed legs.
(D) The stage immediately after the egg hatches, without legs.

Ans :

(C) A young frog that still has a tail but has developed legs.
A frog let is an intermediate stage in frog development. It is a small, young frog that has developed legs but may still retain a tail, transitioning from a fully aquatic tadpole to a more terrestrial adult.

28. How does the habitat of an adult frog generally differ from that of a very young tadpole?
(A) Adult frogs live only on land; tadpoles live only in trees.
(B) Adult frogs can live both in water and on land; young tadpoles are primarily aquatic.
(C) Adult frogs are purely aquatic; tadpoles live on land.
(D) Both adult frogs and young tadpoles live exclusively on land.

Ans :

(B) Adult frogs can live both in water and on land; young tadpoles are primarily aquatic.
Young tadpoles are fully aquatic, breathing with gills and swimming with tails. Adult frogs are amphibious, capable of living in water and on land, having developed lungs and legs.

29. Which of the following is NOT a characteristic of the plant Drovers mentioned in the chapter?
(A) It is an insectivorous plant.
(B) It has saucer-shaped leaves with hair-like projections.
(C) Its hairs move inward to trap insects with sticky ends.
(D) It primarily obtains nutrition from the soil through its roots.

Ans :

(D) It primarily obtains nutrition from the soil through its roots.
Drosera is an insectivorous plant, meaning it traps and digests insects to supplement its nutrition, especially in nutrient-poor soils. While it has roots, it relies on insects for certain nutrients.

30. If you wanted to find mosquito larvae and pupae for observation, where would be the most likely place to look?
(A) In fast-flowing rivers.
(B) In dry, sandy areas.
(C) In stagnant water bodies like puddles or open containers.
(D) On the leaves of tall trees.

Ans :

(C) In stagnant water bodies like puddles or open containers.
Mosquitoes lay their eggs in still or stagnant water. Therefore, their larval and pupal stages, which are aquatic, are most commonly found in such environments.

31. **Assertion (A) :** Plants exhibit growth.
Reason (R) : Plants require food (nutrition) for their growth and development.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Growth is a fundamental characteristic of plants. This growth is fueled by nutrients obtained through processes like photosynthesis and absorption from the soil, which provide the energy and building blocks for development.

32. Which of these statements about seed germination are generally true for bean seeds based on the chapter?
1. Sunlight is essential for germination.
2. Seeds require water for germination.
3. Excess water is always beneficial for germination.

(A) 1 and 2 only
(B) 2 only
(C) 1 and 3 only
(D) 2 and 3 only

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Ans :

(B) 2 only
The bean seeds need water and air for germination; sunlight is not essential for the germination itself. Excess water can be detrimental by limiting air supply.

33. An insectivorous plant like Drosera traps an insect that lands on its leaves. The movement of the hairs to trap the insect is an example of the plant:
(A) Reproducing
(B) Responding to a stimulus (touch and presence of the insect)
(C) Excreting waste products
(D) Germinating

Ans :

(B) Responding to a stimulus (touch and presence of the insect)
The insect landing on the leaf acts as a stimulus. The plant's response – the inward movement of its sticky hairs to trap the insect – is a clear example of a living organism responding to an external stimulus.

34. The life cycle of a silk moth, similar to a mosquito, passes through how many distinct life stages mentioned in the Do you know?
(A) Two stages : egg and adult.
(B) Three stages : egg, larva, and adult.
(C) Four stages : egg, larva, pupa, and adult.
(D) Five stages : egg, young larva, old larva, pupa, and adult.

Ans :

(C) Four stages: egg, larva, pupa, and adult.
The Do you know? box states that the silk moth also passes through four life stages: egg, larva, pupa, and adult, similar to the complete metamorphosis seen in mosquitoes.

35. Why is the initial stage of a bean plant's growth from a seed called germination rather than just 'growth'?
(A) Because it happens very quickly.
(B) Because it involves the seed transforming into a sprout or seedling.
(C) Because it only occurs in the dark.
(D) Because it does not require any water.

Ans :

(B) Because it involves the seed transforming into a sprout or seedling.
Germination specifically refers to the process where a dormant seed begins to sprout and develop into a young plant (seedling) under favorable conditions. It's the initial phase of active growth from a seed.

36. When a living being is no longer able to exhibit essential life characteristics, despite the availability of resources, it is said to be:
(A) Dormant
(B) Hibernating
(C) Dead
(D) Stimulated

Ans :

(C) Dead
Death is defined in the chapter as the state where a living being ceases to show all the essential characteristics of life (like respiration, response, growth), even when necessary resources are present.

37. Which part of the bean seedling typically grows downwards into the soil?
(A) The shoot
(B) The leaves
(C) The root
(D) The flower

Ans :

(C) The root
During germination and subsequent growth, the root of a plant seedling generally grows downwards, anchoring the plant and absorbing water and nutrients from the soil.

38. What is a major difference in the typical habitat of a mosquito larva compared to an adult mosquito?
(A) Larva is terrestrial; adult is aquatic.
(B) Larva is aquatic; adult is primarily terrestrial (though it needs water for breeding).
(C) Both larva and adult are exclusively aquatic.
(D) Both larva and adult are exclusively terrestrial.

Ans :

(B) Larva is aquatic; adult is primarily terrestrial (though it needs water for breeding).
Mosquito larvae are aquatic, living and developing in water. Adult mosquitoes are flying insects that live primarily on land, although females return to water to lay eggs.

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39. Which of these is NOT listed as an essential condition affecting the germination of most seeds, as discussed in the chapter (though exceptions exist for light)?
(A) Availability of water.
(B) Availability of air.
(C) Presence of fertile soil.
(D) Presence of sunlight (for germination itself, not later growth).

Ans :

(D) Presence of sunlight (for germination itself, not later growth).
Water and air are essential for bean seed germination. While soil provides a medium, sunlight is generally not required for the germination process of most seeds, though it's vital for subsequent seedling growth.

40. If a plant's shoot is observed to bend and grow towards a window, this is a response to which stimulus?
(A) Gravity
(B) Touch
(C) Water
(D) Light

Ans :

(D) Light
Plants often exhibit phototropism, which is the growth response towards a light source. A shoot bending towards a window indicates it is growing towards the sunlight coming from that direction.

41. If seeds are sown in soil that is completely waterlogged (excess water), why might germination be poor or fail?
(A) The excess water washes away essential nutrients from the seeds.
(B) The seeds do not receive enough air (oxygen) necessary for respiration.
(C) The seeds become too cold in the waterlogged soil.
(D) The excess water makes the seed coat too hard to break.

Ans :

(B) The seeds do not receive enough air (oxygen) necessary for respiration.
Seeds require oxygen for respiration, which is the process of releasing energy for germination. Waterlogged soil fills air spaces, depriving seeds of oxygen and hindering germination.

42. The part of a germinated seed that develops into the shoot of the plant is called the:
(A) Root
(B) Seed coat
(C) Embryo (specifically the plumule part of the embryo)
(D) Cotyledon

Ans :

(C) Embryo (specifically the plumule part of the embryo)
The embryo within the seed contains the rudimentary parts of the plant. The plumule is the part of the embryo that develops into the shoot (stem and leaves).

43. The life cycle of a mosquito includes an adult stage. Approximately how long may an adult mosquito survive, according to the chapter?
(A) 1 to 2 days
(B) 10 to 15 days
(C) 1 to 2 months
(D) About a year

Ans :

(B) 10 to 15 days
The chapter states that the adult mosquito, after emerging from the pupa, may survive for a period of 10 to 15 days.

44. How does the appearance of a mosquito larva typically differ from that of an adult mosquito?
(A) Larva has wings and legs; adult is worm-like.
(B) Larva is aquatic and worm-like; adult is a flying insect with wings and legs.
(C) Both larva and adult look identical but differ in size.
(D) Larva is a stationary stage; adult is highly mobile.

Ans :

(B) Larva is aquatic and worm-like; adult is a flying insect with wings and legs.
Mosquito larvae are aquatic, elongated, and lack wings or fully developed legs. Adult mosquitoes are terrestrial, flying insects with a distinct body structure including wings and legs.

45. Which of these is NOT a characteristic shared by both the life cycle of a mosquito and a silk moth, as mentioned in the chapter?
(A) Both pass through an egg stage.
(B) Both have a larval stage.
(C) Both have a pupal stage.
(D) Both adult forms are primarily aquatic.

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Ans :

(D) Both adult forms are primarily aquatic.
Both mosquitoes and silk moths undergo complete metamorphosis with egg, larva, pupa, and adult stages. However, adult mosquitoes and silk moths are terrestrial flying insects, not primarily aquatic.

46. A tadpole is observed to have developed hind legs but still possesses a tail and lives in water. This stage is best described as a:
(A) Fully adult frog
(B) Spawn
(C) Early tadpole (no legs)
(D) Late tadpole or frog let

Ans :

(D) Late tadpole or frog let
The development of hind legs while still having a tail signifies a later tadpole stage, which then transitions into a frog let stage as it further develops towards adulthood.

47. **Assertion (A) :** All living beings require food.
Reason (R) : Food provides energy for growth, development, and performing various life functions.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Nutrition (obtaining food) is a fundamental characteristic of life. Food supplies the necessary energy and materials for organisms to grow, develop, repair tissues, and carry out all their life processes.

48. Which of the following are essential for the germination of most seeds?
1. Suitable temperature.
2. Presence of air.
3. Continuous bright sunlight.
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(A) 1 and 2 only
Most seeds require adequate water, air (oxygen), and a suitable temperature for germination. While not explicitly detailed for beans , temperature is a generally accepted factor. Continuous bright sunlight is typically not required for the germination process itself for most seeds.

49. Avadhi observes a plant in her garden whose leaves close up at night and open during the day. This behavior of the amla leaves is an example of the plant:
(A) Performing photosynthesis only at night.
(B) Responding to the stimulus of changing light conditions (day/night).
(C) Conserving water more effectively during the day.
(D) Protecting itself from nocturnal insects.

Ans :

(B) Responding to the stimulus of changing light conditions (day/night).
The closing and opening of leaves in response to sunset and sunrise (changes in light intensity) is a form of nastic movement, demonstrating the plant's ability to respond to environmental stimuli.

50. What is the common term for the process by which living beings produce new ones of their own kind?
(A) Respiration
(B) Excretion
(C) Reproduction
(D) Germination

Ans :

(C) Reproduction
Reproduction is the biological process that results in the formation of new individual organisms, ensuring the continuation of the species.

51. If a plant's shoot grows upwards, away from the ground, this is generally a response to which two stimuli?
(A) Towards gravity and away from light.
(B) Away from gravity (negative gravitropism) and often towards light (phototropism).
(C) Towards water and towards touch.
(D) Away from air and towards heat.

Ans :

(B) Away from gravity (negative gravitropism) and often towards light (phototropism).

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3.	Excretion	C.	Increase in size over time
4.	Reproduction	D.	Process of taking in air (oxygen) and releasing air (carbon dioxide)

(a) 1-C, 2-D, 3-B, 4-A
(b) 1-D, 2-C, 3-A, 4-B
(c) 1-C, 2-A, 3-D, 4-B
(d) 1-B, 2-D, 3-A, 4-C

Ans :

(a) 1-C, 2-D, 3-B, 4-A
Growth is an increase in size. Respiration involves gas exchange. Excretion is waste removal. Reproduction is producing new individuals of the same kind.

63. Match the plant response or structure in Column A with the stimulus or function it relates to in Column B:

	Column A		**Column B**
1.	Touch-me-not leaves folding	A.	Helps in gas exchange for respiration/ photosynthesis
2.	Plant shoot growing upwards	B.	Response to touch stimulus
3.	Plant root growing downwards	C.	Response towards sunlight
4.	Stomata on leaves	D.	Response to gravity (grows into the soil)

(a) 1-A, 2-C, 3-D, 4-B
(b) 1-B, 2-D, 3-C, 4-A
(c) 1-D, 2-A, 3-B, 4-C
(d) 1-B, 2-C, 3-D, 4-A

Ans :

(d) 1-B, 2-C, 3-D, 4-A
Touch-me-not leaves fold on touch. Shoots grow towards sunlight. Roots grow downwards due to gravity. Stomata are pores for gas exchange on leaves.

64. Match the stage in the life cycle of a mosquito in Column A with its characteristic feature in Column B:

	Column A		**Column B**
1.	Egg	A.	Transforms into an adult mosquito
2.	Larva	B.	Flying stage that reproduces
3.	Pupa	C.	Laid on or near water surface
4.	Adult Mosquito	D.	Worm-like creature, lives in water, comes to surface to breathe

(a) 1-C, 2-D, 3-A, 4-B
(b) 1-D, 2-A, 3-C, 4-B
(c) 1-C, 2-B, 3-D, 4-A
(d) 1-B, 2-D, 3-A, 4-C

Ans :

(a) 1-C, 2-D, 3-A, 4-B
Mosquito eggs are laid near water. The larva is a worm-like aquatic stage. The pupa is a non-feeding stage that develops into the adult. The adult is the flying, reproductive stage.

VERY SHORT QUESTION

65. What is the outer covering of a seed called?

Ans :

Seed coat

66. What are the tiny pores on the surface of leaves called?

Ans :

Stomata

67. What is the process of producing new ones of one's own kind called?

Ans :

Reproduction

68. Name an insectivorous plant mentioned in the chapter.

Ans :

Drosera

69. What is the jelly-like cluster of frog eggs known as?

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58. Which features are common to both plants and animals as living beings?
1. Need for food (nutrition).
2. Ability to move from one place to another (locomotion).
3. Process of respiration.

(A) 1 and 2 only
(B) 1 and 3 only
(C) 2 and 3 only
(D) 1, 2, and 3

Ans :

(B) 1 and 3 only
Both plants and animals require nutrition and respire to live. While animals typically exhibit locomotion, most plants are stationary, though they do show other forms of movement.

59. A farmer plants some seeds in a field. After a few days, tiny green shoots emerge from the soil. This initial emergence and development of the young plant from the seed is known as:
(A) Pollination
(B) Fertilization
(C) Germination
(D) Photosynthesis

Ans :

(C) Germination
Germination is the process by which an organism grows from a seed or similar structure. The emergence of shoots from the soil is a clear indication that the seeds have germinated and begun to grow.

MATCHING TYPE QUESTION

60. Match the mixture in Column A with the most suitable simple method of separation from Column B:

	Column A		Column B
1.	Small stones from rice	A.	Winnowing
2.	Husk from wheat grains	B.	Sieving
3.	Bran from flour	C.	Magnetic Separation
4.	Iron nails from sawdust	D.	Handpicking

(a) 1-D, 2-A, 3-B, 4-C
(b) 1-A, 2-D, 3-C, 4-B
(c) 1-D, 2-C, 3-A, 4-B
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(a) 1-D, 2-A, 3-B, 4-C
Stones from rice are handpicked. Husk from wheat is separated by winnowing. Bran from flour is sieved. Iron nails from sawdust are separated using a magnet.

61. Match the purpose of separation in Column A with a relevant scenario in Column B:

	Column A		Column B
1.	To remove undesirable components	A.	Obtaining butter from buttermilk
2.	To obtain a useful solid from solution	B.	Removing small stones from grains before cooking
3.	To separate two useful components	C.	Using a filter paper to get clear water from muddy water
4.	To remove insoluble impurities from a liquid	D.	Getting salt by evaporating seawater

(a) 1-C, 2-D, 3-A, 4-B
(b) 1-B, 2-A, 3-D, 4-C
(c) 1-B, 2-D, 3-A, 4-C
(d) 1-D, 2-A, 3-C, 4-B

Ans :

(c) 1-B, 2-D, 3-A, 4-C
Removing stones makes grains usable. Evaporating seawater yields useful salt. Churning separates useful butter and buttermilk. Filtering muddy water removes insoluble impurities.

62. Match the characteristic of living beings in Column A with its correct description in Column B:

	Column A		Column B
1.	Growth	A.	Process of producing new individuals of the same kind
2.	Respiration	B.	Removal of waste products from the body

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SHORT ANSWER QUESTION

90. Why is it advised not to allow water to stagnate in our surroundings?

Ans :

Stagnant water provides breeding grounds for mosquitoes, which can transmit diseases like malaria and dengue. Preventing stagnation disrupts their life cycle.

91. Explain how a car is different from a living being, even though both can move.

Ans :

A car's movement is not internal or self-initiated, and it does not exhibit other living characteristics like growth, reproduction, or respiration, unlike living beings.

92. How do plants show movement, even though they don't move from one place to another?

Ans :

Plants show movements like the opening of flowers, the inward movement of hair in insectivorous plants like Drosera, and climbers winding around objects.

93. What is the purpose of the sticky ends on the hair-like projections of a Drosera plant?

Ans :

The sticky ends trap insects, which the Drosera plant then uses for nutrition, as it is an insectivorous plant dependent on insects.

94. Why is respiration considered an essential characteristic of all living beings?

Ans :

Respiration is essential because it is the process through which living beings take in air and release it, converting food into energy necessary for survival.

95. Briefly explain the phenomenon of excretion in plants with an example.

Ans :

Plants excrete excess water and minerals, which can be observed as small droplets on the leaves of plants like grasses and roses.

96. What is a stimulus, and provide two examples of how living beings respond to stimuli?

Ans :

A stimulus is anything that prompts a living being to respond. Examples include reacting to stepping on a thorn or the folding of leaves in a touch-me-not plant when touched.

97. Why is reproduction necessary for living beings?

Ans :

Reproduction is necessary for the continuity of life, ensuring that new individuals of their own kind are produced and the species survives across generations.

98. What are the three essential conditions required for the germination of most seeds?

Ans :

The three essential conditions for the germination of most seeds are the right amount of water, air, and suitable light and/or dark conditions.

99. How does water help in the process of seed germination?

Ans :

Water is crucial as it enables necessary processes for growth, softens the seed coat, and helps the tiny embryo inside develop into a plant.

100. Why is air important for seed germination?

Ans :

Seeds need air for germination, as they utilize the air present in the spaces between soil particles. These spaces also facilitate root growth.

101. Does light always inhibit seed germination? Explain with an example.

Ans :

No, not always. While most seeds don't require light, some flowering plant seeds like Coleus and Petunia actually require light to germinate.

102. Describe the general direction of growth for the root and shoot of a plant.

Ans :

Generally, the root of a plant grows downwards, towards the ground, while the shoot grows upwards, away from the ground and towards sunlight.

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Ans :

Spawn

70. Who built the machine called crescograph?

Ans :

Jagadish Chandra Bose

71. What is the initial stage of a mosquito's life cycle after the egg?

Ans :

Larva

72. What do plants excrete in the form of small droplets on leaves?

Ans :

Excess water and minerals

73. What is the term for any event that prompts living beings to respond?

Ans :

Stimulus

74. What is the process of removing waste products from the body called?

Ans :

Excretion

75. What is the process of taking air in and out called?

Ans :

Breathing

76. What does water soften in a seed during germination?

Ans :

Seed coat

77. Which part of a plant generally grows downwards?

Ans :

Root

78. What stage comes after the tadpole with tail in a frog's life cycle?

Ans :

Tadpole with legs

79. What type of plant folds its leaves when touched?

Ans :

Touch-me-not (Mimosa/Chhui-mui)

80. What material is secreted by silk moth larvae?

Ans :

Thread-like material (silk fibre)

81. What helps tadpoles swim in water?

Ans :

Tails

82. Name a disease transmitted by female mosquitoes.

Ans :

Malaria

83. What is the final stage of a plant's life cycle?

Ans :

Death

84. What is the movement seen in climbers?

Ans :

Winding around objects

85. What stage follows the egg stage in a frog's life cycle?

Ans :

Embryo

86. What is urine an example of in animals?

Ans :

Excretion product

87. Which scientist experimented with plants' responses to stimuli?

Ans :

Jagadish Chandra Bose

88. What is the term for a seed turning into a sprout?

Ans :

Germination

89. What condition is not essential for the germination of most seeds?

Ans :

Light

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Plant shoots typically exhibit negative gravitropism (growing against the pull of gravity) and positive phototropism (growing towards a light source, which is essential for photosynthesis).

52. What is the embryo in a seed?
(A) The stored food material for the young plant.
(B) The protective outer layer of the seed.
(C) The tiny, undeveloped plant contained within the seed.
(D) The first root that emerges from the seed.

Ans :

(C) The tiny, undeveloped plant contained within the seed.
The embryo is the core part of a seed, representing a miniature, dormant plant that has the potential to develop into a seedling under favorable conditions.

53. In the life cycle of a frog, which stage immediately follows the tadpole with legs stage, before becoming a fully adult frog?
(A) Spawn
(B) Embryo
(C) Frog let
(D) Pupa

Ans :

(C) Frog let
The life cycle where the tadpole with legs develops into a frog let (a young frog that may still have a tail stub) before maturing into an adult frog.

54. How does respiration in most animals (like humans) differ from how plants primarily exchange gases with the atmosphere?
(A) Animals inhale oxygen and exhale carbon dioxide; plants do the opposite.
(B) Animals use lungs/gills for gas exchange; plants use stomata on leaves.
(C) Animals respire only during the day; plants respire only at night.
(D) Animals do not respire; only plants do.

Ans :

(B) Animals use lungs/gills for gas exchange; plants use stomata on leaves.
While both respire (take in oxygen and release carbon dioxide for energy), animals typically have specialized respiratory organs like lungs or gills. Plants primarily exchange gases through tiny pores called stomata on their leaves.

55. Which of the following is NOT a characteristic of the pupal stage of a mosquito?
(A) It is an aquatic stage.
(B) It is a non-feeding stage.
(C) The adult mosquito emerges from it.
(D) It actively flies to find food.

Ans :

(D) It actively flies to find food.
The pupa is an aquatic, non-feeding, and relatively immobile transformation stage. The adult, flying mosquito emerges from the pupa.

56. A student wants to investigate if bean seeds need air for germination. They set up two pots: Pot X with moist soil and seeds, left open to air; Pot Y with moist soil and seeds, covered with a thick layer of oil to block air. What would be a likely observation after a few days?
(A) Seeds in both pots will germinate equally well.
(B) Seeds in Pot X will germinate, while seeds in Pot Y will not (or germinate poorly).
(C) Seeds in Pot Y will germinate, while seeds in Pot X will not.
(D) Neither pot will show germination as oil is harmful.

Ans :

(B) Seeds in Pot X will germinate, while seeds in Pot Y will not (or germinate poorly).
Air (specifically oxygen) is necessary for seed respiration during germination. Blocking air supply with a layer of oil would inhibit this process in Pot Y, while seeds in Pot X have access to air.

57. **Assertion (A) :** Most plants are considered living beings.
Reason (R) : Plants show characteristics such as growth, response to stimuli, and reproduction.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Plants are classified as living because they exhibit the key characteristics that define life, including the ability to grow, respond to environmental changes, and produce offspring.

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103. What is the life cycle of a plant?

Ans :

The life cycle of a plant is the entire process from a seed growing into a young plant, maturing to produce flowers and fruit, and then forming new seeds, which continue the cycle.

104. What are the four stages in the life cycle of a mosquito?

Ans :

The four stages in the life cycle of a mosquito are egg, larva, pupa, and adult.

105. How does spraying kerosene oil on stagnant water disrupt the mosquito's life cycle?

Ans :

Kerosene oil forms a thin layer on the water surface, separating water from air. This prevents mosquito larvae and pupae from inhaling air, causing them to die.

106. What are tadpoles, and where do they primarily live in the early stages?

Ans :

Tadpoles are the larval stage of a frog. In their early stages, they live entirely in water and have tails for swimming.

107. Explain the transition of a tadpole to a froglet.

Ans :

Tadpoles gradually grow, developing legs while still retaining their tails. They start to resemble small frogs, known as froglets, and begin to spend some time on land.

108. How do adult frogs differ from froglets in terms of habitat and physical features?

Ans :

Adult frogs lose their tails completely and develop strong legs for jumping. Unlike froglets which still spend time in water, adult frogs live both in water and on land.

109. What is the significance of the significant changes observed in the life cycles of animals like mosquitoes and frogs?

Ans :

These significant changes, involving body shape, structure and sometimes habitat, are important for the survival of the species and for maintaining the continuity of their kind.

110. What is the role of the seed coat during seed germination?

Ans :

The seed coat is the outer covering of the seed, and water helps soften it, allowing the tiny embryo inside to develop and emerge.

111. Why do mosquito larvae and pupae repeatedly come to the water surface?

Ans :

Mosquito larvae and pupae, although living in water, require air to respire, so they frequently come to the water surface to breathe.

112. What does it mean when a living being is considered "dead"?

Ans :

A living being is considered dead when it is no longer able to exhibit the essential characteristics of life, such as movement, growth, or reproduction, even with necessary resources.

113. How do the spaces between soil particles assist plant growth?

Ans :

The spaces between soil particles not only provide air for seed germination but also allow the roots of the growing plant to expand and grow easily.

114. What is the 'spawn' in the life cycle of a frog?

Ans :

Spawn refers to the white, jelly-like substance, typically found on the water surface near pond edges, which is actually a cluster of frog eggs.

LONG ANSWER QUESTION

115. Discuss the various characteristics that differentiate living beings from non-living things.

Ans :

Living beings are distinct from non-living things due to several characteristics. They exhibit movement, require food for nutrition and growth, respire by taking in and giving out air, excrete

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CHAPTER 11

NATURE'S TREASURES

1. AIR

Air, particularly the oxygen in it, is essential for the survival of humans and most living beings. We cannot survive without it for more than a few minutes.

1.1 Composition

Air is a mixture of gases. The approximate composition is Nitrogen (78%), Oxygen (21%), and Argon, Carbon Dioxide, and other gases (1%).

1.2 Wind

Moving air is called wind. It can be gentle (breeze) or fast (storm).

1.3 Wind Energy

Wind can rotate things like a firki (paper pinwheel) or the blades of a windmill. Windmills are used to generate electricity, run flour mills, or pump water. India has several large windmill farms (e.g., in Tamil Nadu, Rajasthan, Maharashtra).

2. WATER

1. Importance : Water is essential for daily activities (drinking, cooking, bathing, washing), agriculture, and industries.
2. Sources : Earth's surface is about two-thirds water, mostly saline (salty) water in oceans and seas, which isn't directly usable for most needs.
3. Freshwater : Usable water found in ice sheets, snow, rivers, lakes, ponds, wells, and underground. Easily accessible freshwater (rivers, lakes, etc.) is a very small fraction.
4. Wastage and Conservation : Emphasizes the need to use water efficiently and avoid wastage (e.g., turning off taps, fixing leaks).
5. Water Pollution : Freshwater sources are polluted by trash, waste from homes and industries. Preventing pollution is crucial as polluted water is unfit for consumption.
6. Water Harvesting : Methods for conserving water. Rainwater harvesting collects rainwater for later use. Traditional methods like step wells (Bawadi in Rajasthan, Vav in Gujarat) are examples of historical water harvesting systems in India. World Water Day (March 22nd) highlights water's importance.

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3. ENERGY FROM THE SUN

1. Primary Energy Source : The Sun is the main source of energy (heat and light) on Earth, essential for life.
2. Uses : Drying things (chillies, mangoes, clothes), plant photosynthesis (food production), providing warmth and light.
3. Dependence : All living beings depend directly or indirectly on the Sun's energy (e.g., plants use sunlight; animals eat plants; humans eat plants/animals).
4. Solar Technology : Solar panels capture solar energy to produce electricity. Solar energy is also used directly in solar cookers and solar water heaters.

4. FORESTS

1. Definition : Large areas with dense growth of various plants (herbs, shrubs, trees).
2. Importance : Provide habitats (food and shelter) for many wild animals, birds, and insects. They are a source of various products (fruits like nellikai, timber, medicinal plants, etc.).
3. Conservation : Forest cover is decreasing due to human activities (deforestation). Preserving forests and allowing them to regenerate is vital. Van Mahotsav (July) is an Indian festival promoting tree planting. The Chipko movement is cited as an example of community efforts to protect forests.
4. Ecological Role : Tree roots hold soil, preventing erosion. Decaying leaves enrich the soil with nutrients, supporting further plant growth (natural recycling).

froglet and adult stages. Tadpoles are aquatic and herbivorous, while adult frogs are amphibious. A key difference is the mode of reproduction (eggs laid on water surface by mosquitoes vs. jelly-like spawn by frogs) and the specific forms of their larval and pupal stages.

123. Explain the concept of "death" in living beings within the context of their life cycle.

Ans :

Death in living beings signifies the cessation of all life activities, even when essential resources like food, air, and water are available. It marks the end of their life cycle, where they are no longer able to exhibit characteristics such as growth, movement, respiration, or reproduction. For plants, this can be seen when they stop growing, turn yellow, and dry after fruiting.

124. Describe the changes a frog undergoes from its egg stage to an adult frog.

Ans :

The frog's life begins as eggs, known as spawn, laid in water. These eggs develop into embryos. The embryo hatches into a tadpole, which initially has a tail for swimming and no legs. As it grows, the tadpole develops hind legs, then forelegs. This stage is followed by the froglet, which still has a tail but also legs and starts to spend time on land. Finally, the tail disappears completely, and the froglet transforms into an adult frog, capable of living both in water and on land.

125. How does gravity influence the growth direction of a plant's root and shoot?

Ans :

Gravity plays a crucial role in directing plant growth. Roots exhibit positive gravitropism, meaning they grow downwards in response to gravity, regardless of the plant's orientation. Shoots, on the other hand, exhibit negative gravitropism, growing upwards against the force of gravity. This ensures proper anchorage and access to sunlight for the plant.

126. Explain the term 'respiration' in both animals and plants. How is it similar and different?

Ans :

Respiration is the process by which all living beings exchange gases to release energy. In animals, like humans, it involves inhaling air (oxygen) and exhaling (carbon dioxide and water vapor) through organs like lungs. In plants, respiration occurs through tiny pores called stomata on leaves, where they take in air and release it. While both processes involve gas exchange for energy, the mechanisms and structures involved differ significantly.

127. Discuss how the observation of movement can sometimes be misleading when classifying living and non-living things.

Ans :

Movement can be a deceptive characteristic because some non-living things, like cars, also move. However, their movement is externally driven, unlike living beings that move on their own. Conversely, some living beings, like plants, do not move from one place to another but show other forms of movement, such as flower opening or bending towards light. Therefore, movement alone is not sufficient to distinguish living from non-living.

128. What is the significance of the life cycle in ensuring the continuity of a species, both for plants and animals?

Ans :

The life cycle is crucial for the continuity of a species as it ensures the production of new generations. For plants, seeds lead to new plants that mature, flower, and produce more seeds. For animals, reproduction leads to offspring that grow through various stages to become adults, capable of reproducing themselves. This continuous cycle prevents the extinction of the species and maintains biodiversity.

CASE BASED QUESTION

129. Avadhi wants to grow some bean plants. She takes a pot filled with garden soil and sows bean seeds. She places the pot on her balcony where it receives plenty of sunlight. However, after two weeks, she notices that none of the seeds have germinated. She is puzzled because she thought sunlight was essential for plant growth.

(i) What crucial condition did Avadhi likely miss for the seeds to germinate?

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(ii) Explain why sunlight is not usually essential for seed germination, but water is.
(iii) What should Avadhi do to ensure her bean seeds germinate successfully?

Ans :

(i) Avadhi likely missed providing sufficient water to the seeds for germination.
(ii) Most seeds do not require light for germination; instead, water is crucial as it softens the seed coat and activates the internal processes necessary for the embryo's development into a sprout.
(iii) Avadhi should ensure the soil in her pot is kept moderately moist by adding a regular and sufficient amount of water.

130. Aayush is on a nature walk with his class and observes a unique plant. When he accidentally brushes against its leaves, they immediately fold inwards. The teacher explains that this plant is very sensitive to touch. Later, he also sees some plants with sticky, hair-like structures on their leaves, and the teacher mentions they trap insects.
(i) What characteristic of living beings is demonstrated by the plant whose leaves fold inwards?
(ii) Name the type of plant that has sticky, hair-like structures and traps insects. Why do they do this?
(iii) Are these movements in plants considered movement in the same way an animal moves? Explain.

Ans :

(i) The plant demonstrates the characteristic of responding to stimuli.
(ii) The plant is an insectivorous plant, like Drosera. They trap insects for nutrition because they are dependent on insects for it.
(iii) No, these are specific types of movements within the plant, such as folding leaves or winding, unlike an animal's ability to move from one place to another.

131. During the rainy season, the local community is advised to prevent water stagnation to control mosquito populations. A resident is seen spraying kerosene oil on a small collection of stagnant water in a discarded tire. Another resident suggests covering all water containers.
(i) Why is preventing water stagnation crucial for controlling mosquitoes?
(ii) How does spraying kerosene oil on stagnant water help disrupt the mosquito life cycle? (Explaining)
(iii) What stages of the mosquito life cycle are directly affected by these measures? (Applying)

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Ans :

(i) Preventing water stagnation is crucial because mosquitoes lay their eggs in stagnant water, which serves as a breeding ground for them.
(ii) Kerosene oil forms a thin layer on the water surface, blocking the larvae and pupae from accessing air needed for respiration, causing them to die.
(iii) The egg, larval, and pupal stages are directly affected, as these stages are dependent on stagnant water for development and respiration.

132. Avadhi looks at a picture of herself from four years ago and notices how much she has changed. She tries to wear a dress from that time, but it no longer fits her. Her mother explains that this is because she has grown.
(i) What fundamental characteristic of living beings is illustrated by Avadhi's inability to wear her old dress? (Applying)
(ii) Do non-living things also exhibit this characteristic? Give an example to support your answer.
(iii) Besides growth, what other key characteristic supports the idea that Avadhi is a living being?

Ans :

(i) This illustrates the fundamental characteristic of growth in living beings.
(ii) No, non-living things do not exhibit true growth. For example, a car does not grow in size; it only appears to "grow" through additions, not internal biological processes.
(iii) Besides growth, Avadhi also shows movement, respiration, needs food, excretes, responds to stimuli, and can reproduce in the future.

133. During a school trip to a pond, students observe white, jelly-like clusters floating on the water surface. Upon closer inspection, they also see small, fish-like creatures swimming, some with tiny legs emerging. The teacher explains that these are different stages of a frog's life.
(i) What is the scientific name for the white, jelly-like clusters of frog eggs?

(ii) What are the small, fish-like creatures swimming in the water called, and what do they use to move?

(iii) Describe the habitat change a frog undergoes during its life cycle from the observed stages to an adult.

Ans :

(i) The white, jelly-like clusters of frog eggs are called spawn.

(ii) The small, fish-like creatures are tadpoles, and they use their tails to swim in the water.

(iii) Tadpoles and froglets initially live mostly in water. As they mature into adult frogs, they develop strong legs and lose their tails, becoming capable of living both in water and on land.

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Table : Types of vehicles and fuels used

Type of vehicle	Type of fuel used

Ans :

Type of vehicle	Type of fuel used
Bicycle	Human power / no fuel
Scooter (petrol)	Petrol
Motorcycle	Petrol
Car	Petrol / Diesel / CNG / Electricity (depending on model)
Auto-rickshaw	CNG (some run on petrol or electricity)
City bus	Diesel / CNG / Electricity
Tractor	Diesel
Delivery van	Diesel
E-rickshaw	Electricity (battery)
School bus	Diesel / CNG

Activity 11.6 : Let us make a list of natural resources used

Make a list of activities you do in your daily life and write down the natural resources used directly or indirectly for each activity. In Table, some items are already filled in. Using them as a guide, fill the remaining blank rows.

Table : Natural resources used

Activity	Natural resource
Washing clothes	
Making clay toys	
Collecting firewood	
Making kites	
Having breakfast	

Ans :

Activity	Natural resource
Washing clothes	Water
Making clay toys	Clay (soil) and a little water
Collecting firewood	Wood from trees
Making kites	Paper or bamboo (plant fibres)
Having breakfast	Food from plants and animals (grains, milk, fruits, etc.)

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NCERT EXERCISE

1. Figure shows items related to natural resources. Match them with their jumbled-up names. Make another table and write the names of these resources. Classify these resources as renewable or non-renewable.

Item	Jumbled up name
	Ocrk
	refost
	ndiw
	atwre

Ans :

5. SOIL, ROCKS AND MINERALS

1. Soil Importance : Essential for plant growth. Spaces between soil particles provide air and room for roots. Earthworms help loosen and turn the soil.
2. Soil Composition : Contains sand, decaying organic matter, insects, worms, microorganisms, pebbles, etc. Colour varies based on components.
3. Soil Formation : Formed over thousands of years by the breaking down (disintegration) of rocks due to actions of the Sun, water, and living organisms.
4. Rocks : Used in construction (houses, roads, dams), roofing (slate), building material (laterite bricks). Important types include granite, sandstone, marble. Used for tools historically (hand axes, arrowheads).
5. Minerals : Rocks are made of minerals. Important metals (aluminium, gold, copper, iron) are extracted from minerals. Used in manufacturing various items (vehicles, jewellery, electronics like mobile phones).
6. Conservation : Rocks and minerals take thousands/millions of years to form and should be used responsibly.

6. FOSSIL FUELS

1. Types : Petrol, diesel, kerosene (derived from petroleum), natural gas, and coal.
2. Formation : Formed over millions of years from the remains of ancient organisms buried deep within the Earth.
3. Uses : Petrol/diesel for vehicles; natural gas/LPG for cooking, electricity generation, CNG for vehicles; coal mainly for electricity generation.
4. Issues : Fossil fuels are limited (non-renewable) and will run out if used excessively. Burning them produces smoke and carbon dioxide, causing air pollution.
5. Conservation : Reduce dependence by walking, cycling, using public transport, and exploring alternative energy sources.

7. NATURAL RESOURCES : RENEWABLE AND NON-RENEWABLE

1. Natural Resources : Resources obtained from nature (air, water, sun energy, forests, soil, rocks, minerals, fossil fuels).
2. Human-made Resources : Resources created by humans (furniture, solar panels, vehicles).
3. Renewable Resources : Natural resources that get renewed or replenished within a reasonable time (air, water, forests, solar energy). Should still be used judiciously.
4. Non-renewable Resources : Natural resources found in limited quantities that take millions of years to form and get exhausted once used (fossil fuels, minerals, rocks, soil). Need careful conservation.

8. RESOURCES WE USE

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1. Dependence : Humans use numerous natural resources directly and indirectly in daily life.
2. Environmental Impact : Overuse and pollution (like air pollution from vehicles using fossil fuels in cities) harm the environment. Using alternatives like electric vehicles can reduce pollution.
3. Sustainability : Emphasizes the need to conserve natural resources, use them responsibly without waste, and protect the environment to meet present needs without compromising future generations (inspired by M.K. Gandhi's quote on need vs. greed).

NCERT ACTIVITY

Activity 11.1 : Let us experience (Breathing exercise)

1. Take a deep breath in, and then breathe out slowly.
2. Take a deeper breath in again.
3. Hold your breath for as long as you can and then breathe out slowly.

Question :

(i) How long can you hold your breath?

(ii) How do you feel when you hold your breath?

Ans :

(i) This is different for everyone! Some people can hold their breath for a shorter time, maybe less than half a minute, while others might hold it for closer to a minute or even more. You have to try it and see how long you can hold it comfortably. There isn't one single correct time.

(ii) When you hold your breath : Your body keeps using the oxygen (the gas we need from the air) that you last breathed in. At the same time, your body keeps making a waste gas called carbon dioxide. Since you aren't

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breathing out, this carbon dioxide starts to build up inside you. Your brain senses this buildup of carbon dioxide and knows you need fresh oxygen. This causes the uncomfortable feeling – the strong urge telling you that you must breathe out (to get rid of the extra carbon dioxide) and breathe in (to get more oxygen).

Activity 11.2 : Let us make and decorate

1. Take a square piece of paper (15 cm×15 cm), a pair of scissors, an all-pin and a soft stick.
2. Follow the steps shown in Figure to make a firki (pinwheel).

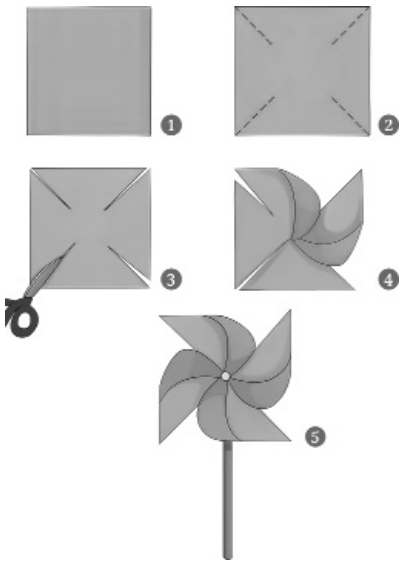

Figure : Firki

The steps involve cutting and folding the square paper and attaching it to the stick using the pin.

Observation :

The firki rotates. Even moving it back and forth makes it rotate.

Ans :

It is the wind (moving air) that makes the firki rotate.

Activity 11.3 : Let us find out

Fill the Column II and Column III in Table.

Table : Wastage of water in your daily activities

	Column I	**Column II**	**Column III**
	Activity	**How is water wasted?**	**Suggest ways to reduce wastage of water.**
1.	Hand washing		
2.	Washing clothes		
3.	Washing utensils		
4.	Taking shower		
5.	Cooking		
6.	Gardening		
7.	Brushing teeth		

Ans :

	Column I **Activity**	**Column II** **How is water wasted?**	**Column III** **Ways to reduce the wastage**
1.	Hand washing	Tap kept running while soaping hands.	Turn off tap while lathering; use a sensor or push-tap.
2.	Washing clothes	Half-load run in a machine / excessive water for bucket wash.	Run washing-machine only on full load or choose the low-water level; reuse rinse water for mopping.
3.	Washing utensils	Continuous flow of water while scrubbing dishes.	Fill a tub with soapy water for scrubbing, then rinse all dishes together; fit an aerator nozzle.
4.	Taking shower	Long showers; shower left on while applying soap/shampoo.	Keep showers short (5 min); close shower while soaping; install low-flow showerhead or use a bucket bath.

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5.	Cooking	Vegetables rinsed under running tap; excess water used for boiling then thrown away.	Wash veggies in a bowl of water; measure only the required water for boiling; cool leftover boiled water and use it for plants.
6.	Gardening	Hose used at midday; over-watering; leaking hose pipe.	Water plants in early morning/evening; use a watering can or drip irrigation; repair leaks; collect rainwater for plants.
7.	Brushing teeth	Tap left open while brushing.	Close tap and use a mug to rin

Activity 11.4 : Let us investigate

1. Collect samples of soils from different areas around your home and school.
2. Guess what could be there in different soils.
3. Observe carefully each soil sample and note its colour.
4. Touch each soil sample and feel its texture.
5. Observe the soil samples with your naked eye. If you have a magnifying lens, look at the soil through it.
6. Record your observations in Table.
7. Is there any difference between your guess and what you can actually observe when you look closely?
8. Do you see any differences in the soil samples taken from different places?
9. Do you see differences in what you are able to observe with your naked eye and what you can observe with a magnifying lens?

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Table : Soil samples

Location from which soil sample was collected	**What I guessed about the soil**	**Observation of soil with naked eye including its colour and texture**	**Observation of soil with magnifying lens**
Soil from a farm after ploughing			

Ans :

Location from which soil sample was collected	**What I guessed about the soil**	**Observation of soil with naked eye (colour & texture)**	**Observation of soil with magnifying lens**
Soil from a farm after ploughing	Dark, full of humus and tiny roots	Brown-black; moist, fine crumbs; small pieces of dry roots	Humus flakes, root hairs, tiny insects, mixed clay-silt grains
Soil from school garden	Rich in leaf matter; many earthworms	Dark brown; loose, slightly lumpy; bits of leaves	Lots of dark organic flakes, worm tunnels, fine sand and clay particles
Roadside soil	Mixed with dust and litter; little humus	Light brown-grey; dry, powdery; tiny gravel	Angular sand grains, minute bits of plastic, very little organic matter
Soil near construction site (sandy heap)	Mostly sand, almost no humus	Pale yellow; very loose, gritty; no lumps	Mostly clear quartz sand grains; a few tiny stones; almost no dark particles

Activity 11.5 : Let us conduct a survey

1. Conduct a survey of vehicles in your neighbourhood.
2. Which types of vehicles are there? What types of fuels do they use?
3. Record the information that you collect in Table.

waste products, respond to stimuli, reproduce to create new ones of their kind, and eventually die. The absence of any of these features generally indicates a non-living entity.

116. Explain how plants, despite being stationary, demonstrate movement. Provide specific examples.

Ans :

Although plants do not move from one place to another, they exhibit various forms of movement. Examples include the opening of flowers, the inward movement of hair-like projections in insectivorous plants like Drosera to trap insects, and climbers winding themselves around nearby objects. These movements are often responses to external stimuli or part of their growth process.

117. Describe the role of Jagadish Chandra Bose in understanding plant responses.

Ans :

Jagadish Chandra Bose was an Indian scientist who conducted pioneering experiments with plants. He invented the crescograph, a machine capable of recording plant responses to stimuli such as light, heat, electricity and gravity. Through his work, he successfully demonstrated that plants are indeed capable of sensing and responding to various environmental cues.

118. Elaborate on the essential conditions required for seed germination and their importance.

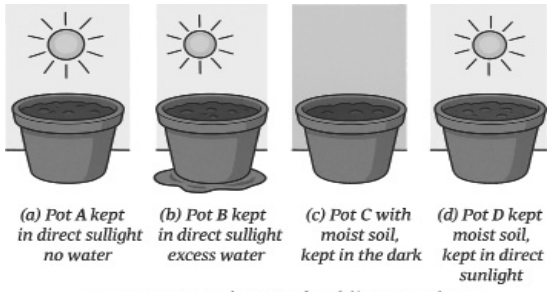
Ans :

For seed germination, the essential conditions are the right amount of water and air. Water is vital as it enables internal processes for growth and softens the seed coat, allowing the embryo to develop. Air, specifically oxygen, is required for respiration by the embryo, which obtains it from spaces between soil particles. While light is generally not essential for most seeds to germinate, it becomes crucial for the seedling's further growth after germination.

119. Design a simple experiment to determine if sunlight is necessary for seed germination.

Ans :

Take two identical pots with moist soil and sow bean seeds in both. Place one pot in direct sunlight and the other in a completely dark location (e.g., a cupboard), ensuring both receive sufficient water. Observe for 7-10 days. If seeds germinate in the dark pot, it suggests sunlight is not essential. If they only germinate in the light, it indicates sunlight is needed.



(a) Pot A kept in direct sullight no water *(b) Pot B kept in direct sullight excess water* *(c) Pot C with moist soil, kept in the dark* *(d) Pot D kept moist soil, kept in direct sunlight*

120. Explain the concept of response to stimuli in living beings, providing examples for both animals and plants.

Ans :

Response to stimuli is a fundamental characteristic of living beings, where they react to any change in their environment. For animals, an immediate withdrawal of a foot after stepping on a sharp object like a thorn is a direct response. In plants, the touch-me-not plant folding its leaves when touched, or certain plants folding leaves after sunset, exemplify their response to touch and light stimuli respectively.

121. Describe the life cycle of a bean plant, highlighting its key stages.

Ans :

The life cycle of a bean plant begins with a seed (Stage I) which undergoes germination (Stage II) with suitable conditions, forming a sprout. This is followed by the appearance of leaves (Stage III), then flowers (Stage IV) and finally fruits (Stage V), which are pods containing new seeds. After fruit formation, the plant gradually dries and dies, but the seeds ensure the continuity of the next generation.

122. Compare and contrast the life cycles of a mosquito and a frog.

Ans :

Both mosquitoes and frogs undergo metamorphosis, having distinct larval and pupal stages before becoming adults. Mosquitoes go through egg, larva, pupa and adult stages, with larvae and pupae being aquatic. Frogs have egg (spawn), embryo, tadpole (with and without legs),

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Item in the picture	Jumbled name	Correct name	Renewable /Non-renewable
Water tap with a stream	atwre	Water	Renewable
Wind-mill	ndiw	Wind	Renewable
Forest scene	refost	Forest	Renewable
Piece of rock	ocrk	Rock (minerals)	Non-renewable

2. State whether the following statements are True [T] or False [F]. If False, correct them.
(i) Nature has all the resources to meet human needs.
(ii) Machines are a resource found in nature.
(iii) Natural gas is a non-renewable resource.
(iv) Air is a renewable resource.

Ans :

(i) [T]
(ii) [F] – Machines are man-made resources.
(iii) [T]
(iv) [T]

3. Fill in the blanks using the most appropriate option
(i) A fuel that is commonly used in two-wheelers like scooters or bikes is
(a) Kerosene
(b) Petrol
(c) Diesel
(d) LPG

Ans :

(b) Petrol.
Petrol is used in two-wheelers because it burns easily and provides the energy needed to run their engines. It 2is suitable for light vehicles like scooters and bikes.
(ii) An example of a renewable resource is
(a) Coal
(b) Water
(c) Natural gas
(d) Petrol

Ans :

(b) Water.
Petrol is used in two-wheelers because it burns easily and provides the energy needed to run their engines. It is suitable for light vehicles like scooters and bikes.

4. Classify the following as renewable or non-renewable resources—coal, natural gas, forests and minerals.

Ans :

Renewable : Forests
Non-renewable : Coal, Natural gas, Minerals

5. Why do we say that petroleum is a non-renewable resource?

Ans :

Petroleum forms very slowly over millions of years from dead plants and animals buried deep in the Earth. Because we use it much faster than it is created, it cannot be replaced within a human lifetime, so it is called non-renewable.

6. It is difficult to regrow forests. Justify this statement.

Ans :

Trees take many years to mature, and a forest includes layers of plants, soil organisms and wildlife that develop together. After large-scale cutting, soil erodes, seeds dry up and the climate changes, so bringing back the same rich forest is slow and difficult.

7. Make a list of five daily activities in which you use natural resources. Suggest ways by which you can reduce their use.

Ans :

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Daily activity	Main resource used	Way to reduce use
Bathing / shower	Water	Take shorter showers; use a bucket.
Travelling to school	Petrol / diesel	Walk, cycle or use public transport.
Lighting the house	Electricity (coal, water)	Switch off lights; use LEDs and daylight.
Writing homework	Paper (trees)	Write on both sides; use e-notes where possible.
Cooking food	LPG / firewood	Use pressure-cookers; cover pans; switch off flame early.

19. How is soil primarily formed?
(A) By the rapid cooling of lava from volcanoes.
(B) By the accumulation of plastic waste over many years.
(C) By the disintegration (breaking apart) of rocks by actions of the Sun, water, and living organisms over a long time.
(D) By human activities like construction and farming.

Ans :

(C) By the disintegration (breaking apart) of rocks by actions of the Sun, water, and living organisms over a long time.
Soil formation is a slow, long-term process involving the weathering and breakdown of rocks due to various physical, chemical, and biological factors, including the action of sunlight, water, and organisms.

20. Which of these are examples of fossil fuels mentioned in the chapter?
(A) Wood, charcoal, and cow dung.
(B) Sunlight, wind, and water.
(C) Petroleum, natural gas, and coal.
(D) Iron, gold, and copper.

Ans :

(C) Petroleum, natural gas, and coal.
Petroleum (from which petrol and diesel are derived), natural gas and coal as the commonly known fossil fuels.

21. Why are petroleum, natural gas, and coal called fossil fuels?
(A) Because they are found near ancient fossils of large animals.
(B) Because they are formed from the remains of ancient microorganisms and plants buried deep inside the Earth over millions of years.
(C) Because they look like fossils when extracted.
(D) Because they were first discovered by archaeologists studying fossils.

Ans :

(B) Because they are formed from the remains of ancient microorganisms and plants buried deep inside the Earth over millions of years.
Fossil fuels originate from the organic matter of prehistoric organisms (plants and tiny marine life) that were buried and subjected to intense heat and pressure over geological time scales, transforming them into these energy-rich substances.

22. What are renewable resources?
(A) Resources that are created by humans in factories.
(B) Resources that are found in unlimited quantities and will never run out.
(C) Resources which get renewed, replenished, or restored within a reasonable period of time through natural processes.
(D) Resources that can only be used once and then are gone forever.

Ans :

(C) Resources which get renewed, replenished, or restored within a reasonable period of time through natural processes.
Renewable resources are those that can be naturally regenerated or replenished over a relatively short time scale (within a human lifetime or so), making them sustainable if used responsibly. Air and water are examples.

23. What is the main difference between renewable and non-renewable resources?
(A) Renewable resources are man-made; non-renewable are natural.
(B) Renewable resources get replenished in a reasonable time; non-renewable resources do not or take millions of years.
(C) Renewable resources are always solids; non-renewable are always liquids or gases.
(D) Renewable resources cause pollution; non-renewable resources are clean.

Ans :

(B) Renewable resources get replenished in a reasonable time; non-renewable resources do not or take millions of years.
The key distinction lies in their rate of regeneration. Renewable resources (like solar energy, wind, forests if managed well) can be replenished naturally. Non-renewable resources (like fossil fuels, minerals) form over geological time scales and are finite.

24. Which of the following is an example of a non-renewable natural resource?
(A) Air
(B) Water
(C) Coal
(D) Forests (when sustain ably managed)

Ans :

(C) Coal

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15. There is an increasing demand of trees for industries and housing. Therefore, trees are being felled. Is it justified? Discuss and prepare a brief report.

Ans :

Cutting trees faster than they grow is not justified because it destroys habitats, causes soil erosion and raises carbon-dioxide levels. Industries should adopt sustainable practices—use recycled wood, plant two trees for every one cut and switch to alternative materials where possible. Housing projects must leave green belts and protect old trees. Communities, government and companies should work together for balanced development.

16. Propose a plan to use less water in your school. What steps would you take to make this plan happen and how would it help the environment?

Ans :

Plan : Save Every Drop

(i) Fix leaks : Check taps and pipes weekly; repair drips.
(ii) Install push or sensor taps : They shut automatically.
(iii) Reuse water : Collect wash-basin water for gardening.
(iv) Awareness posters : Remind students to close taps.
(v) Rain-water harvesting : Channel roof water into a storage tank.

Benefits : Reduces the school's water bill, saves groundwater, and teaches students good conservation habits, helping the environment by lowering strain on local water sources.

MULTIPLE CHOICE QUESTION

1. What are natural resources as described in the chapter?
(A) Resources created by human beings for their convenience.
(B) Resources provided by nature that are essential for sustaining life.
(C) Only the resources found deep within the Earth, like minerals.
(D) Resources that are unlimited and can never be exhausted.

Ans :

(B) Resources provided by nature that are essential for sustaining life.
Natural resources are those materials and energy sources that are provided by nature and are vital for the survival and well-being of all life forms on Earth, including humans.

2. What is the approximate percentage of oxygen in the air?
(A) 78%
(B) 21%
(C) 1%
(D) 50%

Ans :

(B) 21%
The composition of air, shows that oxygen constitutes approximately 21% of the air we breathe.

3. Why is air considered essential for the survival of most living beings?
(A) Because it helps in keeping the weather cool.
(B) Because it contains oxygen, which is needed for bodily functions.
(C) Because it allows birds to fly easily.
(D) Because it is necessary for making sounds travel.

Ans :

(B) Because it contains oxygen, which is needed for bodily functions.
Air contains oxygen, a gas that most living organisms require for respiration. Respiration is the process that releases energy from food to perform various life functions, making oxygen vital for survival.

4. What is wind?
(A) Air that is very cold.
(B) Air that contains a lot of moisture.
(C) Moving air.
(D) Air that is found at high altitudes.

Ans :

(C) Moving air.
Wind as air that is in motion. This movement can range from a gentle breeze to a strong storm.

5. Which of the following is mentioned as one of the leading windmill farms in India?
(A) Thar Desert Wind Park, Rajasthan
(B) Kanyakumari Wind Farm, Tamil Nadu
(C) Muppandal Wind Farm, Tamil Nadu
(D) Himalayan Wind Project, Uttarakhand

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31. What is the term for the breaking apart of rocks over a long time due to actions of the Sun, water, and living organisms?
(A) Fossilization
(B) Disintegration (or Weathering)
(C) Sedimentation
(D) Compaction

Ans :

(B) Disintegration (or Weathering)
The process by which rocks are broken down into smaller pieces by physical, chemical, or biological means (like temperature changes, water action, plant roots) is called weathering or disintegration, leading to soil formation.

32. Which of these metals are extracted from minerals, as mentioned in the chapter?
(A) Plastic and rubber
(B) Wood and paper
(C) Aluminium, gold, copper, and iron
(D) Cotton and silk

Ans :

(C) Aluminium, gold, copper, and iron
The chapter states that important metals such as aluminium, gold, copper, and iron are obtained by extracting them from their respective mineral ores.

33. What is a key difference between air in Ajji's village on the edge of a forest and the air in the city, as noticed by Bhoomi and Surya?
(A) City air is always colder and fresher.
(B) Village air is fresh and cooler; city air smells of smoke and is polluted.
(C) Village air has more dust; city air is very clean.
(D) Both village and city air have identical composition and smell.

Ans :

(B) Village air is fresh and cooler; city air smells of smoke and is polluted.
Bhoomi and Surya observe that the air in Ajji's village is pure, refreshing, and cooler compared to the city air, which is polluted and smells of vehicle smoke.

34. Which of the following is NOT a use of windmills mentioned in the chapter?
(A) To run flour mills.
(B) To pull up water from a well.
(C) To generate electricity.
(D) To create building materials.

Ans :

(D) To create building materials.
The chapter lists running flour mills, pumping water, and generating electricity as common uses of windmills. They are not typically used for creating building materials.

35. If a country has many windmill farms, what natural resource is it primarily utilizing to generate power?
(A) Solar energy
(B) Geothermal energy
(C) Wind energy
(D) Fossil fuels

Ans :

(C) Wind energy
Windmill farms consist of numerous windmills (wind turbines) that capture the kinetic energy of the wind and convert it into electricity.

36. **Assertion (A) :** Forests are important natural resources.
Reason (R) : Forests provide food and shelter to many wild animals, prevent soil erosion, and supply various products useful to humans.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Forests are vital natural resources due to their numerous ecological and economic benefits, including supporting biodiversity, conserving soil, and providing timber, medicinal plants, and other products.

37. Which of the following are considered natural treasures according to Ajji's initial conversation?
1. Pure air
2. Fertile soil
3. Plastic bags
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(A) 1 and 2 only

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Ans :

(B) Traditional water harvesting structures like step wells.
Bawadis and Vavs are traditional stepwells found in India, particularly in arid regions. They are unique architectural structures designed for harvesting and storing rainwater and seepage water.

13. What is the main source of energy on Earth, according to Ajji ?
(A) Wind
(B) Water
(C) The Sun
(D) Fossil fuels

Ans :

(C) The Sun
Ajji explains, and the chapter reiterates, that the Sun is the primary source of energy for Earth. It provides heat and light essential for various processes and for sustaining life.

14. How is the Sun indirectly the source of energy for a cow grazing on grass?
(A) The cow directly absorbs sunlight for energy.
(B) The grass uses sunlight to prepare its food (photosynthesis), which the cow then eats.
(C) The Sun warms the ground, making the grass grow faster.
(D) The cow gets energy from drinking water heated by the Sun.

Ans :

(B) The grass uses sunlight to prepare its food (photosynthesis), which the cow then eats.

Plants like grass use solar energy to produce their own food through photosynthesis. Herbivores like cows consume these plants, thereby deriving energy that originally came from the Sun.

15. A household installs panels on its rooftop that capture the Sun's energy to produce electricity. These panels are known as:
(A) Wind turbines
(B) Geothermal collectors
(C) Solar panels
(D) Hydroelectric generators

Ans :

(C) Solar panels

Solar panels are devices specifically designed to absorb sunlight and convert it into electricity (photovoltaic effect) or to heat water (solar thermal collectors). Their placement on rooftops is common for maximizing sun exposure.

16. What are forests, as defined by Ajji in the chapter?
(A) Small gardens with a few trees.
(B) Areas cleared for farming.
(C) Large areas with dense growth of various types of plants.
(D) Places where only wild animals live, without any plants.

Ans :

(C) Large areas with dense growth of various types of plants.
Ajji describes forests as extensive areas characterized by a high density and variety of plant life, including trees, shrubs and herbs.

17. What is Van Mahotsav?
(A) A festival celebrating the harvest season.
(B) A week-long event in July for planting new trees and raising awareness about forests.
(C) A traditional method of collecting forest produce.
(D) A scientific study of forest ecosystems.

Ans :

(B) A week-long event in July for planting new trees and raising awareness about forests.
Van Mahotsav is a forest festival celebrated in India, typically in July, where new saplings are planted, and efforts are made to increase awareness about the importance of conserving forests.

18. How do the roots of plants in a forest contribute to the soil?
(A) They extract all nutrients, making the soil infertile.
(B) They hold on to the soil and prevent it from being washed away (erosion).
(C) They make the soil very loose and dry.
(D) They convert soil directly into rock.

Ans :

(B) They hold on to the soil and prevent it from being washed away (erosion).
The extensive root systems of plants, especially trees in a forest, bind the soil particles together. This helps to stabilize the soil and prevent it from being eroded by wind or water.

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Ans :

(B) Electric vehicles do not release smoke directly from their operation.
Vehicles running on fossil fuels (petrol, diesel) produce exhaust smoke containing pollutants. Electric vehicles, powered by batteries, do not have tailpipe emissions of smoke, contributing to reduced local air pollution.

44. What are human-made resources?
(A) Natural resources that have been slightly modified by humans.
(B) All resources found on Earth, including natural ones.
(C) Resources created by human beings for their convenience and to meet their needs.
(D) Resources that are only used by humans and not by other living beings.

Ans :

(C) Resources created by human beings for their convenience and to meet their needs.
Human-made resources are those that are developed or manufactured by humans using natural resources and technology to serve various purposes and make life more comfortable, such as buildings, tools and vehicles.

45. Which of the following was NOT mentioned by Ajji as one of the treasures of nature at her village?
(A) Pure air
(B) Fertile soil
(C) Abundant sunlight
(D) Advanced communication networks

Ans :

(D) Advanced communication networks
Ajji highlighted pure air, fertile soil, and abundant sunlight as some of the natural treasures of her village. Advanced communication networks are human-made infrastructure, not direct treasures of nature in this context.

46. How does the availability of freshwater compare to the total amount of water on Earth's surface?
(A) Most of the Earth's water is freshwater.
(B) Freshwater and saline water are found in equal proportions.
(C) A very small fraction of Earth's water is easily accessible freshwater; most is saline.
(D) All water on Earth's surface is freshwater.

Ans :

(C) A very small fraction of Earth's water is easily accessible freshwater; most is saline.
While water covers about two-thirds of the Earth, the vast majority is saline ocean water. Easily accessible freshwater (in rivers, lakes, accessible groundwater) constitutes only a very small percentage of the total.

47. All of the following are listed as uses of water in daily life or industry EXCEPT:
(A) Drinking and cooking
(B) Generating wind energy
(C) Growing crops (agriculture)
(D) Industrial processes

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Ans :

(B) Generating wind energy
Water is essential for drinking, cooking, bathing, agriculture, and various industrial activities. Wind energy is generated from moving air, not directly from water in the same context as the other uses.

48. If a family installs a solar water heater on their roof, which natural resource are they primarily utilizing to heat their water?
(A) Geothermal energy from the Earth
(B) Energy from the Sun
(C) Wind energy
(D) Energy from burning fossil fuels

Ans :

(B) Energy from the Sun
A solar water heater is designed to absorb solar radiation (sunlight) and use that energy to heat water, thus directly utilizing energy from the Sun.

49. **Assertion (A) :** Burning fossil fuels contributes to air pollution.
Reason (R) : When fossil fuels are burnt, smoke and gases like carbon dioxide are produced and released into the atmosphere.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
The combustion of fossil fuels releases various substances into the air, including smoke (particulate matter) and greenhouse gases like

Coal is a fossil fuel that formed over millions of years from ancient plant matter. It is extracted from the Earth and is found in limited quantities, making it a non-renewable resource.

25. Which of the following actions helps in conserving fossil fuels?
(A) Driving alone in a car for short distances.
(B) Using public transport or cycling instead of private vehicles.
(C) Leaving lights and appliances on when not in use.
(D) Preferring goods transported over very long distances.

Ans :

(B) Using public transport or cycling instead of private vehicles.
Using public transport, walking, or cycling reduces the number of individual vehicles on the road, thereby decreasing the overall consumption of fossil fuels like petrol and diesel.

26. **Assertion (A) :** The Sun is considered the main source of energy on Earth.
Reason (R) : Plants use solar energy to produce food, and animals obtain energy by eating plants or other animals that ate plants.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
The Sun's energy is captured by plants through photosynthesis. This energy then flows through the food chain as animals consume plants or other animals, making the Sun the ultimate source of energy for most life on Earth.

27. Which of the following are examples of human-made resources?
1. Solar panels
2. Rivers
3. Furniture
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(C) 1 and 3 only
Solar panels and furniture are created by human beings using natural resources and technology. Rivers are natural resources, provided by nature.

28. A community decides to collect rainwater from rooftops and store it in large tanks for use during dry seasons.
This practice is an example of:
(A) Water pollution
(B) Rainwater harvesting
(C) Fossil fuel conservation
(D) Soil erosion prevention

Ans :

(B) Rainwater harvesting
Collecting and storing rainwater from rooftops or other surfaces for later use is known as rainwater harvesting. It is a method of water conservation.

29. What is CNG, mentioned as a cleaner fuel for vehicles?
(A) Condensed Natural Gas
(B) Carbonated Natural Gas
(C) Compressed Natural Gas
(D) Cooled Nitrogen Gas

Ans :

(C) Compressed Natural Gas
CNG stands for Compressed Natural Gas. It is used as a vehicular fuel and is generally considered cleaner burning than petrol or diesel, producing fewer pollutants.

30. Why is it important to use natural resources judiciously and responsibly?
(A) Because they are too expensive to extract.
(B) To fulfill present needs while saving for the future and without harming the environment.
(C) Because natural resources are only meant for human use.
(D) To prevent them from becoming too abundant.

Ans :

(B) To fulfill present needs while saving for the future and without harming the environment.
Judicious and responsible use of natural resources ensures their availability for future generations (sustainability) and minimizes negative environmental impacts associated with their over-extraction or misuse.

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Ans :

(C) Muppandal Wind Farm, Tamil Nadu
Muppandal Wind Farm in Tamil Nadu, Jaisalmer Wind Park in Rajasthan, and Brahmanvel Wind Farm in Maharashtra as some of the leading windmill farms in India.

6. What is the primary purpose of windmills ?
(A) To provide shade in sunny areas.
(B) To create artificial wind for cooling.
(C) To run flour mills, pull up water, or generate electricity using wind energy.
(D) To act as decorative structures in farms.

Ans :

(C) To run flour mills, pull up water, or generate electricity using wind energy.
Windmills harness the energy of the wind to perform useful work, such as grinding grain in flour mills, pumping water from wells, or, most commonly in modern times, generating electricity.

7. What is saline water?
(A) Water that is fresh and suitable for drinking.
(B) Water that is found in glaciers and ice sheets.
(C) Water that is salty, like the water found in oceans and seas.
(D) Water that has been purified through filtration.

Ans :

(C) Water that is salty, like the water found in oceans and seas.
Saline water is characterized by its high salt content. The vast majority of Earth's water, found in oceans and seas, is saline and not directly suitable for drinking or most agricultural uses.

8. What proportion of the Earth's surface is covered by water?
(A) About one-third
(B) About half
(C) About two-thirds
(D) About three-fourths

Ans :

(C) About two-thirds
The water covers approximately two-thirds of the Earth's surface, with most of this water being saline and found in oceans and seas.

9. What is the main difference between saline water and freshwater in terms of usability for domestic purposes?
(A) Saline water is always hotter than freshwater.
(B) Freshwater is salty, while saline water is not.
(C) Saline water is not fit for domestic use due to its salt content; freshwater is suitable.
(D) Freshwater can only be found underground.

Ans :

(C) Saline water is not fit for domestic use due to its salt content; freshwater is suitable.
The high salt concentration in saline water makes it unsuitable for drinking, agriculture, and most industrial uses without desalination. Freshwater has a low salt content and is essential for these activities.

10. Which of the following activities leads to water pollution, as mentioned in the chapter?
(A) Rainwater harvesting.
(B) Dumping waste from homes and industries into water sources.
(C) Using water efficiently for hand washing.
(D) Performing breathing exercises near a river.

Ans :

(B) Dumping waste from homes and industries into water sources.
The chapter explicitly states that freshwater sources are polluted by throwing trash and dumping waste from homes and industries into them, rendering the water unfit for consumption.

11. What is the primary purpose of rainwater harvesting?
(A) To prevent floods during heavy rainfall.
(B) To collect and store rainwater for later use, thereby conserving water.
(C) To increase the salinity of groundwater.
(D) To generate electricity from rainwater.

Ans :

(B) To collect and store rainwater for later use, thereby conserving water.
Rainwater harvesting is a method of collecting and storing rainwater that falls on rooftops or other surfaces, rather than letting it run off. This stored water can then be used later, helping to conserve freshwater resources.

12. What are Bawadi in Rajasthan or Vav in Gujarat examples of?
(A) Modern water purification plants.
(B) Traditional water harvesting structures like step wells.
(C) Natural hot springs.
(D) Canals for irrigating fields.

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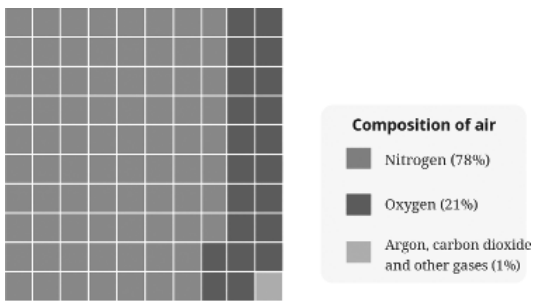
Ajji mentions pure air and fertile soil as treasures of nature that enrich their lives. Plastic bags are human-made items and often pollutants, not natural treasures in this context.

38. To reduce reliance on fossil fuels for transportation, a city introduces electric vehicles that run on batteries charged using electricity.
This shift primarily promotes the use of:
(A) More non-renewable resources.
(B) Renewable energy sources.
(C) Geothermal energy only.
(D) Nuclear energy.

Ans :

(B) Renewable energy sources.
Electric vehicles themselves do not burn fossil fuels directly. If the electricity used to charge them comes from renewable sources like solar and wind, this represents a shift towards cleaner, sustainable energy.

39. What is the composition of nitrogen in the air by percentage, according to Figure.



Composition of air

(A) 21%
(B) 1%
(C) 78%
(D) 50%

Ans :

(C) 78%
Figure, depicting air composition, clearly shows that nitrogen makes up the largest portion of air, approximately 78%.

40. Why is it mentioned that it takes many years to grow a new forest or restore lost forests?
(A) Because trees only grow in specific seasons.
(B) Because tree seeds are very rare and difficult to find.
(C) Because trees are slow-growing organisms, and forest ecosystems are complex and take time to establish.
(D) Because animals constantly eat young saplings.

Ans :

(C) Because trees are slow-growing organisms, and forest ecosystems are complex and take time to establish.
Trees, especially large ones that form the backbone of a forest, grow slowly over decades or even centuries. Furthermore, a forest is a complex ecosystem involving many interdependent species, and its regeneration is a lengthy process.

41. What is the general term for resources that are found in limited quantities and, once used, get exhausted because they are not produced or replenished within a reasonable period?
(A) Human-made resources
(B) Abundant resources
(C) Renewable resources
(D) Non-renewable resources

Ans :

(D) Non-renewable resources
Non-renewable resources are finite and take exceptionally long periods (often millions of years) to form. Their rate of consumption far exceeds their rate of natural replenishment, leading to their eventual depletion.

42. Which important weather parameter, monitored at weather stations worldwide, is mentioned as being useful for making weather forecasts?
(A) Soil moisture content
(B) Air temperature
(C) The number of birds in an area
(D) The height of the tallest trees

Ans :

(B) Air temperature
Air temperature is an important weather parameter. Data gathered on air temperature, along with other parameters, is crucial for making weather forecasts.

43. Why are electric vehicles mentioned as a less polluting alternative to vehicles that use fossil fuels?
(A) Electric vehicles are much lighter in weight.
(B) Electric vehicles do not release smoke directly from their operation.
(C) Electric vehicles can travel much longer distances on a single charge.
(D) Electric vehicles are made from recycled materials.

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8. List four activities that are possible due to the presence of air.

Ans :

Breathing, flying kites or aeroplanes, burning fuels (oxygen supports fire), running windmills to generate electricity.

9. How can you contribute towards enhancing the green cover of your locality? Make a list of actions to be taken.

Ans :

1. Plant and look after saplings along roads and in parks.
2. Join neighborhood tree-plantation drives.
3. Water young plants during dry spells.
4. Say no to cutting healthy trees; report illegal felling.
5. Use recycled paper to lower the demand for fresh wood.

10. In the given illustration, we see that food is being cooked.

Answer the following questions

(i) What type of energy is being used for cooking?

(ii) Name one benefit and one drawback of using this type of energy for cooking.

Ans :

(i) Type of energy used : Solar energy (solar cooker).

(ii) One benefit : Clean, free and renewable—no smoke or fuel cost.

11. Cutting down trees on a large scale impacts the quality of the soil. Why do you think it is so?

Ans :

Tree roots bind the soil. When trees are removed the soil becomes loose and is easily washed or blown away, leading to erosion and loss of nutrients.

12. Explain two ways in which human activities pollute the air. Propose one action which can help in reducing air pollution.

Ans :

1. Vehicle exhaust : Burning petrol and diesel releases smoke and gases.
2. Factory emissions : Industries burn coal and oil, adding pollutants.

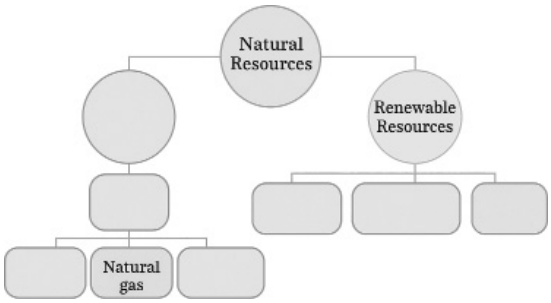
Action : Use public transport or cycle; this cuts down the number of fuel-burning vehicles on the road.

13. A family uses solar panels, a gas stove and a windmill. What would happen if there were no sunlight for a week?

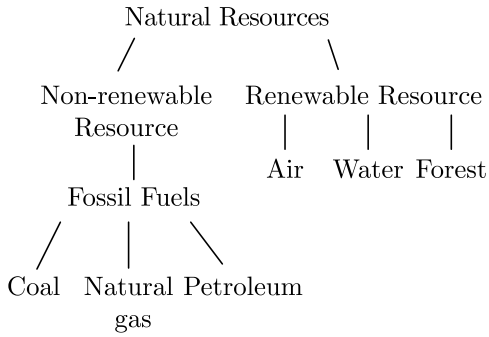
Ans :

The solar panels would stop producing electricity, so any appliances depending on solar power would not run. The gas stove (LPG) and the windmill would still work, but the family would face a shortage of solar electricity.

14. Fill up the blanks using the following terms—fossil fuels, forest, air, petroleum, coal, water and non-renewable resource



Ans :



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carbon dioxide, which are major contributors to air pollution.

50. Which of the following are natural resources that can be classified as renewable?
1. Coal
2. Sunlight
3. Forests

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(B) 2 and 3 only
Sunlight is a continuously available renewable resource. Forests, if managed sustain ably (replanted and allowed to regenerate), can also be considered renewable. Coal is a non-renewable fossil fuel.

51. A village community notices that their local river is becoming dirty due to trash being thrown into it and untreated waste from a nearby small factory. This situation is an example of:
(A) Efficient water management.
(B) Water pollution.
(C) Rainwater harvesting.
(D) Soil conservation.

Ans :

(B) Water pollution.
The introduction of harmful substances like trash and untreated industrial waste into the river, making it unsafe for use and harmful to aquatic life, is a clear instance of water pollution.

52. What traditional practice involves digging trenches lined with stone blocks to store rainwater and seepage from nearby water bodies, common in Rajasthan and Gujarat?
(A) Building large dams
(B) Constructing step wells (Bawadi/Vav)
(C) Using modern filtration plants
(D) Covering ponds to prevent evaporation

Ans :

(B) Constructing step wells (Bawadi/Vav)
The chapter describes step wells (Bawadi or Vav) as traditional water harvesting structures designed to collect and store rainwater and water seeping from other sources, especially in arid regions.

53. How do earthworms contribute positively to soil health, as mentioned in the context of Ajji's garden?
(A) They compact the soil, making it harder.
(B) They consume all the nutrients from the soil.
(C) They help in turning and loosening the soil, improving aeration.
(D) They primarily help in spreading plant seeds.

Ans :

(C) They help in turning and loosening the soil, improving aeration.
Earthworms are natural agents that burrow through the soil. Their movement helps to turn over soil layers and create channels, which loosens the soil and improves air circulation within it.

54. What are rocks primarily made up of?
(A) Fossil fuels
(B) Compressed plants
(C) Minerals
(D) Solidified water

Ans :

(C) Minerals
Rocks are naturally occurring solid aggregates composed of one or more minerals or mineralized. Minerals are the fundamental building blocks of rocks.

55. Which important event related to forest conservation is celebrated for a week across India during July, involving planting new trees?
(A) Earth Day
(B) World Water Day
(C) Van Mahotsav
(D) Wildlife Week

Ans :

(C) Van Mahotsav
Van Mahotsav is described as a week-long festival in July dedicated to planting trees and promoting forest conservation and awareness across India.

56. How do the consequences of over-dependence on fossil fuels differ from utilizing solar energy?
(A) Fossil fuels are cleaner; solar energy causes more air pollution.
(B) Fossil fuels are renewable; solar energy is non-renewable.
(C) Burning fossil fuels causes air pollution; solar energy is a cleaner, renewable source.
(D) Both have identical environmental impacts.

Ans :

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(C) Burning fossil fuels causes air pollution; solar energy is a cleaner, renewable source.
The combustion of fossil fuels is a major source of air pollution. Solar energy, being a renewable resource, is harnessed without direct emissions, making it a much cleaner alternative.

57. Which of the following is NOT a direct use of solar energy mentioned in the chapter?
(A) Plants making food (photosynthesis).
(B) Drying clothes or chillies.
(C) Generating electricity using solar panels.
(D) Powering wind turbines.

Ans :

(D) Powering wind turbines.
Plants use solar energy for photosynthesis, and humans use it for drying and generating electricity via solar panels. Wind turbines are powered by wind, which is indirectly influenced by solar energy (due to differential heating of Earth's surface), but it's not a direct use of solar energy in the same way.

58. If you observe that the leaves falling from trees in a forest decay and enrich the soil, what natural process is this an example of?
(A) Soil erosion
(B) Water pollution
(C) Recycling in nature
(D) Fossil fuel formation

Ans :

(C) Recycling in nature
The decomposition of fallen leaves returns nutrients to the soil, which are then used by new plants to grow. This continuous breakdown and reuse of organic matter is a fundamental part of nutrient cycling or recycling in natural ecosystems.

59. **Assertion (A) :** It is important to conserve minerals and use them responsibly.
Reason (R) : Minerals take thousands to millions of years to form and are non-renewable resources.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Minerals are formed through slow geological processes, making them non-renewable on human time scales. Their finite nature necessitates responsible use and conservation to ensure future availability.

60. Which of the following are ways to conserve water mentioned or implied in the chapter?
1. Turning off taps when not in use.
2. Fixing water leakages.
3. Rainwater harvesting.
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(D) 1, 2, and 3
The reducing water wastage by turning off taps and fixing leaks. It also highlights rainwater harvesting as a method for conserving water. All three are valid conservation measures.

MATCHING TYPE QUESTION

61. Match the condition for seed germination in Column A with its role in Column B:

	Column A		Column B
1.	Water	A.	Most seeds do not need it for germination, but seedlings do
2.	Air	B.	Enables processes for growth and softens seed coat
3.	Sunlight (for most seeds)	C.	Part of the seed that develops into a new plant
4.	Embryo	D.	Required for respiration by the germinating seed

(a) 1-D, 2-B, 3-A, 4-C
(b) 1-B, 2-D, 3-C, 4-A
(c) 1-B, 2-D, 3-A, 4-C
(d) 1-A, 2-C, 3-B, 4-D

Ans :

(c) 1-B, 2-D, 3-A, 4-C
Water softens the seed coat and activates growth. Air is needed for the seed's respiration. Most seeds

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don't need sunlight to germinate. The embryo is the part that grows into a plant.

62. Match the stage in the life cycle of a frog in Column A with its description in Column B:

	Column A		Column B
1.	Spawn	A.	Young frog with legs and a diminishing tail, partly aquatic
2.	Tadpole (early)	B.	Cluster of frog eggs in a jelly-like substance
3.	Froglet	C.	Lives both on land and in water, has strong legs, no tail
4.	Adult Frog	D.	Aquatic, has a tail for swimming, no legs yet

(a) 1-A, 2-D, 3-C, 4-B
(b) 1-C, 2-A, 3-B, 4-D
(c) 1-B, 2-D, 3-A, 4-C
(d) 1-B, 2-C, 3-D, 4-A

Ans :

(c) 1-B, 2-D, 3-A, 4-C
\Spawn is a cluster of frog eggs. Early tadpoles are aquatic with tails and no legs. Froglets are young frogs with legs and a reducing tail. Adult frogs live on land and water.

63. Match the natural resource in Column A with its primary characteristic or use in Column B:

	Column A		Column B
1.	Air	A.	A. Main source of energy for Earth, used in solar panels
2.	Water	B.	Mixture of gases (Nitrogen 78%, Oxygen 21%)
3.	Sun	C.	Formed from ancient plant/animal remains, e.g., petroleum
4.	Fossil Fuels	D.	Essential for drinking, agriculture; conserved by rainwater harvesting

(a) 1-B, 2-D, 3-A, 4-C
(b) 1-D, 2-B, 3-C, 4-A
(c) 1-B, 2-A, 3-D, 4-C
(d) 1-A, 2-D, 3-B, 4-C

Ans :

(a) 1-B, 2-D, 3-A, 4-C
Air is a mixture of gases. Water is vital and conserved via harvesting. The Sun is our main energy source. Fossil fuels like petroleum are from ancient organic matter.

64. Match the type of resource in Column A with its correct definition or example in Column B:

	Column A		Column B
1.	Renewable Resource	A.	Created by human beings for convenience (e.g., furniture)
2.	Non-renewable Resource	B.	Replenished by natural processes within a reasonable time (e.g., forests)
3.	Natural Resource	C.	Limited in quantity, not replenished quickly (e.g., coal, minerals)
4.	Human-made Resource	D.	Obtained from nature, essential for survival (e.g., soil)

(a) 1-C, 2-B, 3-A, 4-D
(b) 1-B, 2-D, 3-C, 4-A
(c) 1-D, 2-A, 3-B, 4-C
(d) 1-B, 2-C, 3-D, 4-A

Ans :

(d) 1-B, 2-C, 3-D, 4-A
Renewable resources replenish naturally. Non-renewable resources are finite. Natural resources come from nature. Human-made resources are created by people.

65. Match the environmental concern or practice in Column A with the natural resource it primarily relates to in Column B:

	Column A		Column B
1.	Rainwater Harvesting	A.	Forests (conservation by community action)
2.	Chipko Movement	B.	Air (impacted by burning of some resources)
3.	Composition of Air	C.	Water (a method of conservation)
4.	Petroleum and Coal	D.	Non-renewable energy sources (Fossil Fuels)

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96. What are fossil fuels? Name the three main types of fossil fuels.

Ans :

Fossil fuels are formed from the ancient remains of organisms buried deep inside the Earth over millions of years. The three main types are coal, petroleum, and natural gas.

97. Why is Compressed Natural Gas (CNG) considered a cleaner fuel than petrol or diesel?

Ans :

CNG is considered cleaner because it produces fewer harmful emissions and pollutants when burned compared to petrol or diesel, thus causing less air pollution.

98. Differentiate between natural resources and human-made resources with one example each.

Ans :

Natural resources are provided by nature (e.g., air, water). Human-made resources are created by humans for their convenience (e.g., electric bulbs, furniture).

99. Explain what renewable resources are, giving two examples.

Ans :

Renewable resources are those that can be renewed, replenished, or restored by natural processes within a reasonable time. Examples include air, water, and forests.

100. Explain what non-renewable resources are, giving two examples.

Ans :

Non-renewable resources exist in limited quantities and are not replenished within a reasonable human time scale once used up. Examples include coal, petroleum, and minerals.

101. Why is it important to conserve fossil fuels?

Ans :

Fossil fuels are limited (non-renewable) and take millions of years to form. Conserving them ensures they last longer and reduces pollution from their combustion.

102. Mention two ways to reduce water wastage in daily activities.

Ans :

Turn off taps when not in use (e.g., while brushing teeth). Fix any water leakages promptly in pipes or taps.

103. What are the consequences of large-scale cutting of trees on forests?

Ans :

Large-scale cutting of trees (deforestation) leads to loss of habitat for wildlife, soil erosion, and reduced capacity of forests to regenerate quickly.

104. Name two ways solar energy is directly used, apart from generating electricity with solar panels.

Ans :

Solar energy is directly used for cooking in a solar cooker and for heating water in a solar water heater.

105. How does throwing trash into rivers and lakes affect freshwater sources?

Ans :

Throwing trash into rivers and lakes pollutes these freshwater sources, making the water unfit for consumption by living beings and harming aquatic life.

LONG ANSWER QUESTION

106. Describe the composition of air. Why is oxygen particularly important for most living beings?

Ans :

Air is a mixture of gases, primarily nitrogen (about 78%) and oxygen (about 21%). It also contains small amounts of argon, carbon dioxide, and other gases. Oxygen is vital as most living beings need it for respiration, a process that releases energy from food for survival and bodily functions.

107. What is rainwater harvesting? Explain its importance and describe one traditional method of rainwater harvesting practiced in India, like step wells.

Ans :

Rainwater harvesting is the collection and storage of rainwater for future use. It's important for conserving water, especially in areas with

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82. What cleaner fuel, derived from natural gas, is used in vehicles?

Ans :

Compressed Natural Gas (CNG) is used.

83. What are resources provided by nature called?

Ans :

Resources provided by nature are called natural resources.

84. What are resources that get renewed or replenished within a reasonable period of time called?

Ans :

These are called renewable resources.

85. Give one example of a non-renewable natural resource.

Ans :

Coal (or petroleum, natural gas, minerals, rocks, soil).

SHORT ANSWER QUESTION

86. List the two major gases in the air and their approximate percentages.

Ans :

The two major gases are Nitrogen (approximately 78%) and Oxygen (approximately 21%). These gases make up most of the air we breathe.

87. How does a firki (paper pinwheel) demonstrate the presence of wind?

Ans :

A firki rotates when you run with it or when air blows on it. This rotation is caused by moving air, which is wind.

88. Why is most of the Earth's water not directly usable for drinking or agriculture?

Ans :

Most of the Earth's water is found in oceans and seas, which is saline (salty) and therefore not fit for most domestic, agricultural, or industrial uses without treatment.

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89. What is rainwater harvesting? Give one traditional example from India.

Ans :

Rainwater harvesting is the collection and storage of rainwater for later use. A traditional example is step wells (Bawadis/Vavs) used in regions like Rajasthan and Gujarat.

90. How do plants utilize energy from the Sun?

Ans :

Plants use sunlight (solar energy) to prepare their own food through the process of photosynthesis. This food supports their growth and development.

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91. Briefly explain how the Sun is the ultimate source of energy for a cow eating grass.

Ans :

Grass (a plant) makes its food using sunlight. The cow eats the grass, thereby obtaining energy that originally came from the Sun.

92. What is a forest? Mention two important things forests provide to wild animals.

Ans :

A forest is a large area with dense growth of various plants. Forests provide food and shelter to many wild animals, including birds and insects.

93. What was the Chipko movement, and what was its main aim?

Ans :

The Chipko movement, started in the 1970s in Uttarakhand, was an effort by local people, especially women, to prevent the cutting of trees by hugging them.

94. How do the roots of plants and decaying leaves contribute to soil health in forests?

Ans :

Plant roots hold the soil, preventing erosion. Leaves that fall and decay enrich the soil with nutrients, supporting new plant growth.

95. How are rocks used in construction? Give two examples of rocks used as building materials.

Ans :

Rocks are used for houses, buildings, roads, and dams. Slate is used for roofing, and laterite can be used as bricks.

(a) 1-A, 2-C, 3-D, 4-B
(b) 1-C, 2-D, 3-A, 4-B
(c) 1-C, 2-A, 3-B, 4-D
(d) 1-D, 2-B, 3-A, 4-C

Ans :

(c) 1-C, 2-A, 3-B, 4-D
Rainwater harvesting conserves water. Chipko movement was for forest conservation. Air composition includes Nitrogen and Oxygen. Petroleum and coal are key fossil fuels (non-renewable).

VERY SHORT QUESTION

66. What gas present in the air is essential for our body to perform its functions?

Ans :

Oxygen is essential for our body to perform its functions.

67. What is moving air called?

Ans :

Moving air is called wind.

68. Name one use of windmills.

Ans :

Windmills can be used to generate electricity (or run flour mills, pull up water).

69. What percentage of the air is composed of nitrogen?

Ans :

Nitrogen comprises approximately 78% of the air.

70. What type of water is found in oceans and seas, making it unfit for most domestic uses?

Ans :

Saline or salty water is found in oceans and seas.

71. Name one easily accessible source of freshwater.

Ans :

Rivers (or lakes, ponds, wells).

72. What is the practice of collecting and storing rainwater for later use called?

Ans :

This practice is called rainwater harvesting.

73. What is the common name for step wells in Rajasthan?

Ans :

Step wells are commonly known as Bawadi in Rajasthan.

74. What is the main source of energy on Earth?

Ans :

The Sun is the main source of energy on Earth.

75. What device captures the Sun's energy to produce electricity?

Ans :

Solar panels capture the Sun's energy to produce electricity.

76. What are large areas with dense growth of various types of plants called?

Ans :

These are called forests.

77. What is the week-long event celebrated in July to increase green cover called?

Ans :

This event is called Van Mahotsav.

78. Name the famous movement started in the early 1970 s in Uttarakhand to prevent the cutting of trees.

Ans :

The famous movement is the Chipko movement.

79. How is soil primarily formed?

Ans :

Soil is formed by the disintegration (breaking apart) of rocks.

80. Name one important metal extracted from minerals found in rocks.

Ans :

Aluminium (or gold, copper, iron).

81. Name one common fossil fuel obtained from petroleum.

Ans :

Petrol (or diesel, kerosene).

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water scarcity. Step wells (Bawadis/Vavs) are traditional structures with steps leading down to a water source. They collect rainwater and also water seeping from nearby sources, storing it for community use.

108. Explain how the Sun is the primary source of energy for almost all life on Earth, tracing the energy flow from the Sun to a human eating a plant-based meal.

Ans :

The Sun emits light and heat. Plants use sunlight for photosynthesis to produce food (energy). Humans eat these plants (or animals that ate plants), thus obtaining energy that originated from the Sun. This makes the Sun the primary energy source, driving food chains and sustaining life.

109. What are forests, and why are they considered a valuable natural treasure? Discuss at least three important roles of forests.

Ans :

Forests are large areas with dense plant growth. They are valuable because :

1. They provide habitat (food and shelter) for diverse wildlife.
2. They play a crucial role in soil conservation, with roots preventing erosion and decaying leaves enriching soil.
3. They provide essential resources for humans like timber, medicinal plants, and help regulate climate.

110. What are rocks and minerals? Give examples of how they are utilized by humans and why their conservation is important.

Ans :

Rocks are natural solid formations, often made of minerals. Minerals are naturally occurring substances with specific compositions. Humans use rocks for construction (granite, marble) and minerals for extracting metals (iron, gold), manufacturing electronics, etc. Conservation is vital as they are non-renewable and take millions of years to form.

111. What are fossil fuels? Describe how they are formed and name two common fossil fuels with one major use for each. Why is their over-dependence a concern?

Ans :

Fossil fuels (coal, petroleum, natural gas) formed from the remains of ancient organisms buried under heat and pressure over millions of years. Petroleum yields petrol (for vehicles) and natural gas is used for cooking. Over-dependence is a concern because they are non-renewable and their combustion causes significant air pollution.

112. Differentiate clearly between renewable and non-renewable natural resources, providing two examples for each category. Why is the judicious use of all natural resources important?

Ans :

Renewable resources (e.g., sunlight, air, forests if managed well) can be replenished naturally within a reasonable time. Non-renewable resources (e.g., coal, petroleum, minerals) are finite and take millions of years to form. Judicious use is vital to ensure availability for future generations and to minimize environmental harm.

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113. Discuss two major human activities that lead to water pollution. What are the consequences of consuming polluted water?

Ans :

1. Dumping untreated domestic sewage and industrial waste into water bodies.
2. Improper disposal of solid waste, like plastics, which end up in rivers and lakes. Consuming polluted water can cause various diseases like cholera, typhoid, and dysentery, and harm aquatic ecosystems, affecting organisms that depend on clean water.

114. How can individual actions contribute to the conservation of fossil fuels? Suggest three practical ways an individual can reduce their fossil fuel consumption.

Ans :

Individuals can conserve fossil fuels by :

1. Walking or cycling for short distances instead of using vehicles.
2. Using public transport more often to reduce the number of private vehicles on the road.
3. Carpooling with others when private vehicle use is necessary, reducing per-person fuel consumption.

115. Ajji mentions that the soil in her village is very fertile. What factors contribute to soil fertility, and how do forests play a role in maintaining it?

CHAPTER 12

BEYOND EARTH

1. STARS AND CONSTELLATIONS

1. Introduction : Starts with twins Yangdol and Dorjay in Ladakh admiring the clear night sky and hearing stories about how stars were used for navigation.
2. Stars : Celestial bodies that shine with their own light. Some appear brighter than others.
3. Constellations : Historically, groups of stars forming patterns resembling familiar shapes (animals, objects, characters). Currently defined by the International Astronomical Union (IAU) as 88 specific regions of the sky, which include these traditional patterns. These patterns helped in navigation before modern technology.

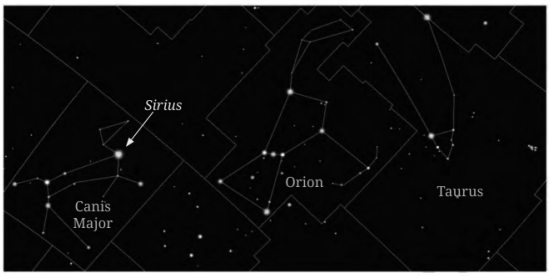

Figure : Some constellations and stars

Examples :

(i) Orion (Hunter) : Recognizable by three stars forming a belt. Often imagined battling Taurus (Bull) and followed by Canis Major (Dog).

(ii) Canis Major : Contains Sirius, the brightest star in the night sky.

(iii) Taurus : Contains Aldebaran (Rohini) and the Pleiades star cluster (Krittika).

(iv) Ursa Major : Contains the Big Dipper pattern (Saptarishi in India).

(v) Ursa Minor : Contains the Little Dipper pattern and the Pole Star (Dhruva tara).

4. Pole Star (Polaris) : Appears stationary in the North direction in the Northern Hemisphere, crucial for finding North.
5. Nakshatras : In Indian astronomy, specific stars or groups of stars (e.g., Ardra - Betelgeuse in Orion, Rohini - Aldebaran in Taurus, Krittika - Pleiades in Taurus).
6. Cultural Significance : Different cultures, including tribal communities in India, have their own names and stories for star patterns.

2. NIGHT SKY WATCHING

1. Visibility Issues : City lights (light pollution), smoke, dust, and obstructions like buildings/ trees can hinder star visibility. Dark, open areas away from cities offer the best views. Light pollution is a growing global problem affecting astronomy.
2. Variability : Not all stars/constellations are visible from all locations on Earth or throughout the year. (e.g., Pole Star not visible from the Southern Hemisphere).
3. Identification Aids : Recognizing patterns requires knowing their appearance and location. Sky maps, mobile apps (like Sky Map, Stellarium), or online resources help identify celestial objects and predict their visibility.
4. Preparation : Requires identifying a dark, open location, choosing a clear, moonless night (especially for dim objects), using sky maps/apps, possibly a compass, and allowing eyes to adjust to darkness (~30 mins). Adult supervision is crucial.
5. Locating Specific Objects:
   (i) Big Dipper & Pole Star : Find the Big Dipper (visible in summer early nights in the north), then use the two end stars of its cup to draw an imaginary line northwards to find the Pole Star (about 5 times the distance between the pointer stars).
   (ii) Orion & Sirius : Orion is visible in winter evenings (Dec-Apr in India). Locate the three belt stars first. An imaginary line through the belt stars eastward leads to Sirius.

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(iii) It helps the environment by reducing storm water runoff and conserving groundwater. It helps the school by providing a supplementary water source and reducing water bills.

120. A farmer uses a diesel-powered tractor for ploughing his fields and a diesel pump for irrigation. He notices the price of diesel increasing and is concerned about air pollution in his village.

(i) What type of natural resource is diesel?

(ii) Name two negative impacts associated with the extensive use of diesel as mentioned.

(iii) Suggest one alternative energy source or practice the farmer could explore for either ploughing or irrigation to reduce reliance on diesel.

Ans :

(i) Diesel is derived from petroleum, which is a non-renewable fossil fuel.

(ii) Increasing price (economic impact due to resource depletion) and air pollution are two negative impacts.

(iii) For irrigation, the farmer could explore solar-powered water pumps. For ploughing, traditional methods with animals or improved manual tools might be options in some contexts.

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Ans :

Soil fertility depends on the presence of nutrients, organic matter, and a good structure that allows water retention and aeration.

Forests contribute by :

1. The decomposition of fallen leaves and other organic matter enriching the soil with nutrients (humus).
2. Plant roots holding the soil together, preventing erosion of the fertile topsoil.

CASE BASED QUESTION

116. A village community relies heavily on a nearby river for drinking water, irrigation, and domestic use. Recently, a small factory set up upstream started releasing its waste directly into the river. The villagers have noticed the water becoming discolored and fish dying.

(i) What natural resource is being affected in this scenario?

(ii) What is the primary cause of the problem faced by the villagers?

(iii) Suggest one immediate action the villagers could take and one long-term solution to address this issue.

Ans :

(i) The natural resource being affected is freshwater from the river.

(ii) The primary cause is water pollution due to the factory releasing its waste into the river.

(iii) Immediate action : Report the pollution to local authorities. Long-term solution : Advocate for proper waste treatment by the factory before discharge.

117. Surya's family decides to install solar panels on their rooftop. They also started using a solar cooker for some of their cooking needs and replaced their old car with an electric vehicle.

(i) What natural resource are they primarily utilizing by installing solar panels and using a solar cooker?

(ii) How do these actions help in conserving non-renewable resources like fossil fuels?

(iii) Is solar energy a renewable or non-renewable resource? Explain why.

Ans :

(i) They are primarily utilizing energy from the Sun (solar energy).

(ii) Using solar energy for electricity and cooking, and using an electric vehicle reduces the direct consumption of fossil fuels (like coal for electricity, LPG for cooking, petrol for cars).

(iii) Solar energy is a renewable resource because the Sun provides a virtually inexhaustible supply of energy daily, which is naturally replenished.

118. A community living near a forest extensively cuts down trees for firewood and to clear land for agriculture. Over time, they observe increased soil erosion during rains and a decrease in the local wildlife population.

(i) What natural resource is being depleted due to the community's actions?

(ii) Explain how cutting down trees leads to increased soil erosion.

(iii) What impact does deforestation have on local wildlife mentioned in the scenario?

Ans :

(i) Forests are the natural resource being depleted.

(ii) Tree roots bind the soil together. When trees are cut, the soil becomes loose and is easily washed or blown away by rain and wind, leading to erosion.

(iii) Deforestation leads to loss of habitat (shelter) and food sources for local wildlife, causing a decrease in their population.

119. In a region with seasonal rainfall, a school decides to implement a rainwater harvesting system. They plan to collect rainwater from the school rooftop and store it in an underground tank for later use in toilets and gardening.

(i) What is the primary purpose of this rainwater harvesting system?

(ii) Is rainwater a renewable or non-renewable resource in this context?

(iii) How does this initiative help the environment and the school?

Ans :

(i) The primary purpose is to conserve water by collecting and storing rainwater for non-potable uses, reducing reliance on other freshwater sources.

(ii) Rainwater is a renewable resource as it is replenished through the natural water cycle.

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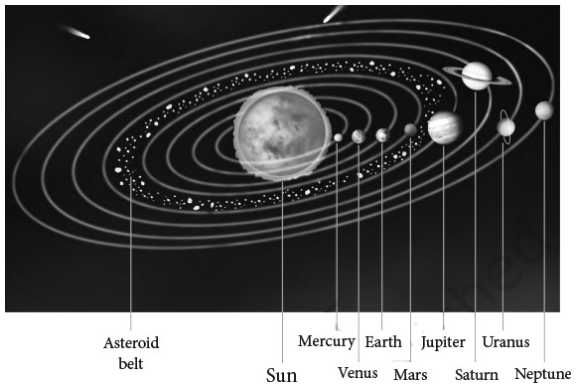
3. OUR SOLAR SYSTEM

1. Definition : Comprises the Sun, eight planets, their moons, asteroids, comets, and other smaller objects.



2. The Sun
   (i) Nature : The star closest to Earth, an extremely hot sphere of gases producing immense heat and light. Appears large because it's close, though many stars are bigger.
   (ii) Size & Distance : About 100 times Earth's diameter. About 150 million km (1 astronomical unit, au) from Earth.
   (iii) Importance : Main source of energy for Earth, responsible for climate, seasons, water cycle, essential for life (plants use sunlight for food). Worshipped as a deity (Surya) in India.
   (iv) Nearest Star (after Sun) : Proxima Centauri, about 269,000 au away.
3. Planets
   (a) Definition : Large, nearly spherical objects revolving around the Sun. They rotate on their axes as they revolve.
   (b) Order from Sun : Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.
   (c) Inner Planets : Mercury, Venus, Earth, Mars. Smaller, rocky surfaces.
   (d) Outer Planets : Jupiter, Saturn, Uranus, Neptune. Much larger, mostly gaseous, often have rings.
   (e) Notable Planets : Venus (brightest after Sun/Moon, Morning/Evening Star), Mars (Red Planet), Earth (Blue Planet).
   (f) Temperature : Generally colder farther from the Sun, but atmosphere affects temperature (Venus is hotter than Mercury).
   (g) Dwarf Planets : Smaller objects like Pluto, redefined by IAU in 2006.
   (h) Visibility : Venus, Mercury, Mars, Jupiter, Saturn are visible to the naked eye. They look like stars but don't twinkle as much. Uranus and Neptune require telescopes.
4. Natural Satellites
   (i) Definition : Objects revolving around planets (commonly called moons). Generally smaller than planets.
   Examples : Earth (1 Moon), Mars (2 Moons), Jupiter, Saturn, Uranus, Neptune (many moons).
   (ii) The Moon : Earth's natural satellite, ~384,000 km away. Revolves around Earth in ~27 days. About 1/4 Earth's diameter. Surface has craters (impact marks), no significant atmosphere, water, or life. India's Chandrayaan missions study the Moon; August 23rd is National Space Day in India marking Chandrayaan-3's landing.
5. Asteroids
   (i) Definition : Small, rocky, irregular objects revolving around the Sun.
   (ii) Asteroid Belt : Most orbit between Mars and Jupiter. Sizes range from 10m to ~ 500 km. Can sometimes pass close to Earth.
6. Comets
   (i) Definition : Icy-rocky bodies made of dust, gas, rock, ice, visiting from outer Solar System.
   (ii) Appearance : Develop long tails (evaporating material) when near the Sun. Appear dim when far away.
   (iii) Orbit : Many orbit the Sun periodically (e.g., Halley's Comet, appears every 76 years). Some escape the Solar System or break up/fall into the Sun/planets. Known as Dhumaketu or Pucchya-Taro in India.

4. THE MILKY WAY GALAXY

1. Definition : A faint band of light visible across the night sky from dark locations. It is our home galaxy, containing millions to billions of stars.
2. Our Place : The Solar System is a part of the Milky Way Galaxy (Akasha Ganga).

5. THE UNIVERSE

1. Vastness : Contains many galaxies beyond the Milky Way.

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Venus is often visible as a very bright object in the eastern sky before sunrise (as the Morning Star) or in the western sky after sunset (as the Evening Star) due to its orbit being closer to the Sun than Earth's.

17. How can one generally distinguish a planet from a star when observing the night sky with the naked eye?
(A) Planets are always much dimmer than stars.
(B) Stars appear to twinkle a lot, while planets usually do not (or twinkle less).
(C) Planets always appear larger than stars to the naked eye.
(D) Stars move rapidly across the sky, while planets remain stationary.

Ans :

(B) Stars appear to twinkle a lot, while planets usually do not (or twinkle less).
The twinkling effect of stars is due to Earth's atmospheric turbulence distorting their point-like light. Planets, being closer, appear as tiny discs, and their light is less affected by this turbulence, so they tend to shine more steadily.

18. What are natural satellites of planets commonly called?
(A) Asteroids
(B) Comets
(C) Moons
(D) Stars

Ans :

(C) Moons
Celestial bodies that naturally orbit planets are called their natural satellites. The most common term for these natural satellites is moons. Earth has one Moon.

19. Approximately how long does Earth's Moon take to complete one revolution around the Earth?
(A) About 24 hours
(B) About 7 days
(C) About 27 days
(D) About 365 days

Ans :

(C) About 27 days
The Moon completes one orbit around the Earth in approximately 27.3 days (its sidereal period).

20. What are the circular bowl-like structures observed on the Moon's surface called, and how were most of them formed?
(A) Valleys, formed by water erosion.
(B) Mountains, formed by volcanic activity.
(C) Craters, formed by the impact of asteroids or rocks from space.
(D) Canals, believed to be man-made.

Ans :

(C) Craters, formed by the impact of asteroids or rocks from space.
The Moon's surface is characterized by numerous craters. These are predominantly impact craters, formed when meteoroids, asteroids, or comets collided with the lunar surface.

21. **Assertion (A) :** Stars shine with their own light.
Reason (R) : Stars are extremely hot, spherical balls of gases that produce a huge amount of energy.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
Stars, including our Sun, generate their own light and heat through nuclear fusion processes occurring within their hot, dense cores. This energy production is what makes them luminous.

22. Which of the following are components of our Solar System?
1. The Sun
2. Eight planets and their moons
3. Comets and asteroids
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(D) 1, 2, and 3
Our Solar System comprises the Sun (a star), the eight planets orbiting it, the moons (natural satellites) of these planets, as well as smaller bodies like asteroids, comets, and dwarf planets.

23. An astronomer is using a telescope to view celestial objects. They are able to see faint objects that are not visible to the naked eye and observe details on planets more clearly.

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look along this line towards the east. This will lead to Sirius.

Ans :

1. I looked for Orion in the sky after sunset in January, facing the southern sky.
2. I first found three bright stars in a line—these formed Orion's Belt.
3. After identifying Orion, I followed an imaginary line through the belt stars towards the east.
4. This led me to a very bright star—this is Sirius, the closest and brightest star visible from Earth (after the Sun).
5. It was interesting to learn how stars and constellations can help locate other stars

Activity 12.4 : Let us try to identify

1. For most of the year, Venus can be located either at dawn or at dusk.
2. When you are viewing at dawn, look for it near the Eastern direction before sunrise.
3. When you are viewing at dusk, look for it near the Western direction after sunset.

While many of the objects in the sky can be seen with our naked eyes directly, we can see them brighter and larger using a pair of binoculars or an instrument called a telescope (Figure). A telescope also helps us view many dim objects not visible by our naked eyes directly.

Figure : A telescope

You may get an opportunity to view the sky through a telescope whenever a night sky watching event is organized in your region.

Ans :

(i) I tried to spot Venus early in the morning before sunrise and saw a bright star-like object in the eastern sky—that was Venus, also called the Morning Star.

(ii) One evening after sunset, I looked in the western sky and found the same bright object again—it was Venus acting as the Evening Star.

(iii) Later, I attended a night sky event with a telescope. It showed me craters on the Moon, Jupiter's moons, and Saturn's rings—which we can't see with the naked eye.

(iv) I learned that telescopes make distant and faint space objects easier to see and study.

(v) These activities helped me understand how planets, stars, and other objects appear in the sky. It was an exciting experience!

NCERT EXERCISE

1. Match the column:

	Column I		**Column II**
(i)	Satellite of Earth	(a)	Orion
(ii)	Red planet	(b)	Venus
(iii)	Constellation	(c)	Mars
(iv)	Planet which is commonly called an evening star	(d)	Moon

Ans :

(i) → (d), (ii) → (c), (iii) → (a), (iv) → (b)

2. (i) Solve the following riddle.
My first alphabet is in MAN but not in CAN
My second alphabet is in ACE and also in FAN
My third alphabet is in RAT and not in CAT
My fourth alphabet is in SUN but not in FUN
I am a planet that moves around the Sun.

(ii) Make two similar riddles by yourself.

Ans :

(i) MARS
(ii) STAR, MOON

3. Which of the following is not a member of our Solar System?
(i) Sirius
(ii) Comets
(iii) Asteroids

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2. Extraterrestrial Life : Currently no evidence of life elsewhere, but scientists search, focusing on exoplanets (planets orbiting other stars in our galaxy).

NCERT ACTIVITY

Activity 12.1 : Let us draw

1. Figure shows bright stars in one part of the night sky.

Figure : A part of the night sky

2. Look at it carefully and try to imagine a pattern formed by a group of stars.
3. Draw lines to connect the stars and make the pattern.
4. Think of an animal or an object that is similar to the pattern drawn by you. Write its name near your pattern.
5. Repeat the above steps and make some more patterns.
6. Now think of an interesting story about your patterns.

Compare your patterns with the patterns drawn by your friends. Are the patterns same or different? Narrate your story to others and listen to their stories. Do you notice that everyone's patterns, names and stories are different? Is it not fun?

Ans :

1. I looked at the star map and joined some stars to make a pattern that looked like a fish.
2. I named my pattern Shiny Fish.
3. Then I made another pattern that looked like a kite and named it Sky Dancer.

My story : The Shiny Fish swims through the stars and glows at night to guide lost birds. The Sky Dancer floats in the sky, celebrating festivals among the stars.

When I compared with my friends, they saw different animals and objects in the same stars. One saw a rabbit, another saw a sword.
It was fun to see how we all imagined different stories and names using the same group of stars!

Activity 12.2 : Let us try to locate

1. Look for the Big Dipper during summer time in the early part of the night, say, around 9 p.m. View the sky above the horizon towards the northern part of the sky and identify the Big Dipper.
2. Once you identify the Big Dipper, try to locate the Pole Star. Look at the two stars present at the end of the Big Dipper's cup and imagine a straight line passing through these towards the north. At about five times the distance between these two stars, the imaginary line will lead to another star which is not very bright. This star is the Pole Star.

You may also locate the bright constellation Orion and the star Sirius in the night sky.

Ans :

1. I went outside at around 9 p.m. and looked towards the northern sky.
2. I saw a group of seven stars shaped like a spoon — this is the Big Dipper.
3. I focused on the two stars at the edge of the cup part of the Dipper.
4. I imagined a line extending through them and looked about five times that distance in the same direction.
5. I found a less bright star in that line — that was the Pole Star.
6. Later, I also spotted Orion, which looked like a hunter, and saw Sirius, one of the brightest stars in the night sky.
7. It was exciting to locate real stars and constellations just by using star patterns

Activity 12.3 : Let us try to identify

1. In India, Orion is best viewed during the months of December to April after sunset. So, look for it during that period.
2. Three bright stars in a short straight line are located around the middle of Orion (imagined to be the belt of a hunter). Identify these three stars first, as this is the easiest way to find Orion.
3. Once you identify Orion, it is easy to locate the very bright star Sirius which is located close to Orion. Imagine a straight line passing through the three middle stars of Orion and

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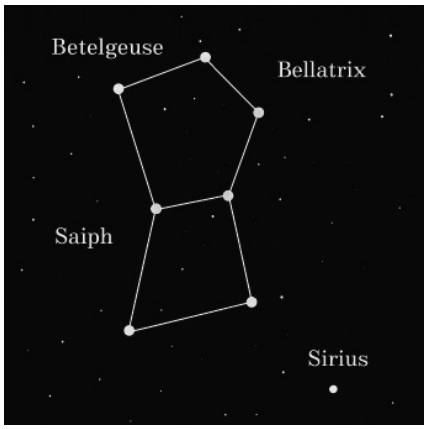

9. You can see stars fading away at dawn and appearing at dusk. During the day we do not see the stars. Explain why.

Ans :

We do not see stars during the day because the light from the Sun is very bright. This bright sunlight scatters in the atmosphere and overpowers the dim light of the stars. Although stars are still present in the sky during the day, they become invisible due to the Sun's brightness.

10. During a clear night, try to observe the Big Dipper 3–4 times at an interval of 2 to 3 hours. Also try to locate the Pole Star each time. Does the Big Dipper appear to move? Draw a rough sketch to illustrate this, mentioning the time in each case.

Ans :

When observed several times during the night, the Big Dipper appears to change its position in the sky. This is because of the rotation of the Earth on its axis.

1. If you observe it at intervals of 2 to 3 hours, it appears to rotate around the Pole Star (Polaris).
2. The Big Dipper seems to move counterclockwise in the northern sky.
3. You can draw a series of sketches showing the Big Dipper in different positions around the Pole Star, labeled with time (e.g., 8 PM, 10 PM, 12 AM).

11. Think about the night sky and write a poem or a story on it.

Ans :

In the sky so deep and wide,
Shining stars in the night abide.
Orion hunts with bow so bright,
While Sirius guards with steady light.
The Big Dipper swings in silent grace,
Around the Pole Star's glowing face.
I watch the sky and dream away,
Of galaxies where night holds sway.

MULTIPLE CHOICE QUESTION

1. What is a constellation, as traditionally understood and commonly used?
(A) A single, very bright star in the night sky.
(B) A region of the sky containing only planets.
(C) A group of stars that appear to form a recognizable pattern or shape.
(D) An instrument used for observing distant stars.

Ans :

(C) A group of stars that appear to form a recognizable pattern or shape.
Traditionally, constellations refer to apparent groupings of stars that form imaginary outlines or patterns, often representing animals, mythological figures, or objects, which help in navigating the night sky.

2. What is the name of the brightest star in the night sky, located in the constellation Canis Major?
(A) Betelgeuse (Ardra)
(B) Polaris (Pole Star)
(C) Sirius
(D) Aldebaran (Rohini)

Ans :

(C) Sirius
The Sirius, found in the constellation Canis Major (the Great Dog), as the brightest star visible in our night sky.

3. Why was recognizing star patterns and constellations a useful skill in olden times, especially for sailors and travellers?
(A) It helped them predict the weather accurately.
(B) It was primarily used for telling time during the day.
(C) It helped them in finding directions (navigation) at sea or on land.
(D) It was mainly for creating horoscopes and astrological charts.

Ans :

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(iv) Pluto

Ans :

(i) Sirius
Sirius is a star located outside our Solar System, in the constellation Canis Major. Comets and asteroids are small bodies that revolve around the Sun and are part of the Solar System. Pluto was once a planet and is now considered a dwarf planet, but still belongs to our Solar System.

4. Which of the following is not a planet of the Sun?
(i) Jupiter
(ii) Pluto
(iii) Neptune
(iv) Saturn

Ans :

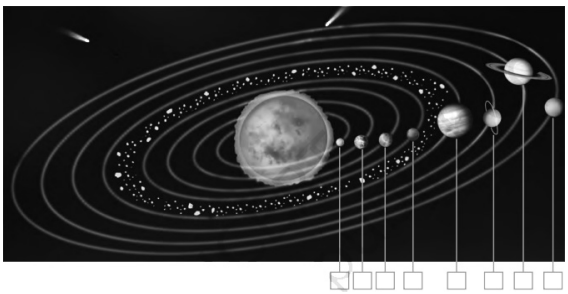
(ii) Pluto
Pluto was once considered the ninth planet but is now classified as a dwarf planet by the International Astronomical Union (IAU). So, it is not counted as a main planet of the Sun in the Solar System.

5. Which is the brighter star, the Pole Star or Sirius?

Ans :

Sirius is the brightest star in the night sky. Although the Pole Star (Polaris) is important for navigation, Sirius shines much more brightly and is clearly visible in the constellation Canis Major.

6. An artist's representation of the Solar System is given in Figure. Is the order of the planets correct? If not, write the correct order in the boxes in the figure.

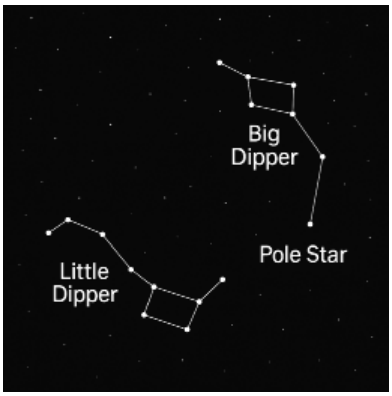


Ans :

The order of the planets in the figure may not be correct. The correct order from the Sun is: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.This is the scientifically accepted order of the 8 planets in the Solar System based on their increasing distance from the Sun.

7. A portion of night sky with stars is shown in Figure . Look carefully and identify the groups of stars that form the patterns the Big Dipper and the Little Dipper. Draw lines to connect the stars for these patterns and label them. Also, identify and label the Pole Star. You may refer to Figure for help.

Ans :



8. A portion of the night sky is shown in Figure. Draw lines to connect the stars for Orion and label the star Sirius. You may refer to Figure .

Ans :

10. Approximately how far is the Sun from the Earth?
(A) 150 thousand km
(B) 1.5 million km
(C) 150 million km
(D) 15 billion km

Ans :

(C) 150 million km
The distance of the Sun from the Earth is about 150 million kilo metres. This distance is also defined as one astronomical unit (au).

11. Why do other stars appear as mere points of light in the night sky, even though some are much bigger than our Sun?
(A) Because they are much colder than our Sun.
(B) Because they are vastly farther away from Earth than our Sun.
(C) Because they do not produce their own light.
(D) Because Earth's atmosphere blocks most of their light.

Ans :

(B) Because they are vastly farther away from Earth than our Sun.
The immense distances to other stars cause them to appear as tiny points of light, despite their potentially large actual sizes. Our Sun appears large because it is relatively very close.

12. What is a planet?
(A) A small, rocky object that orbits a planet.
(B) A collection of stars forming a recognizable pattern.
(C) A large, nearly spherical object that revolves around a star (like the Sun).
(D) A celestial body that emits its own light.

Ans :

(C) A large, nearly spherical object that revolves around a star (like the Sun).
A planet is defined as a celestial body that orbits a star (in our case, the Sun), is massive enough for its own gravity to round it into a nearly spherical shape, and has cleared its orbital neighborhood (though this last part is a more modern IAU addition not fully detailed for this grade level).

13. Which planet is known as the Red Planet because its soil is reddish in colour?
(A) Venus
(B) Mars
(C) Jupiter
(D) Earth

Ans :

(B) Mars
Mars appears reddish due to the presence of iron oxide (rust) in its soil and rocks, earning it the nickname Red Planet.

14. How do the inner four planets (Mercury, Venus, Earth, Mars) generally differ from the outer four planets (Jupiter, Saturn, Uranus, Neptune) in our Solar System?
(A) Inner planets are larger and gaseous; outer planets are smaller and rocky.
(B) Inner planets are smaller and have solid, rocky surfaces; outer planets are much larger and mostly gaseous.
(C) Inner planets all have rings; outer planets do not.
(D) Inner planets are colder; outer planets are hotter.

Ans :

(B) Inner planets are smaller and have solid, rocky surfaces; outer planets are much larger and mostly gaseous.
The Solar System has a clear division: the inner planets are relatively small, dense, and terrestrial (rocky). The outer planets are gas giants (Jupiter, Saturn) or ice giants (Uranus, Neptune), significantly larger and less dense.

15. Which of the following is NOT one of the eight planets in our Solar System?
(A) Mercury
(B) Earth
(C) Pluto
(D) Neptune

Ans :

(C) Pluto
Pluto was formerly classified as the ninth planet but was reclassified as a dwarf planet by the IAU in 2006. The eight official planets are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.

16. If you are observing the sky at dawn and see a very bright, star-like object near the Eastern horizon, which planet is it most likely to be?
(A) Mars
(B) Jupiter
(C) Venus
(D) Saturn

Ans :

(C) Venus

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(C) It helped them in finding directions (navigation) at sea or on land.
Before modern technology like GPS or magnetic compasses, specific star patterns and constellations served as reliable guides for navigation, helping travellers determine directions like North.

4. According to the International Astronomical Union (IAU), how many constellations officially divide the entire sky?
(A) 44 constellations
(B) 66 constellations
(C) 88 constellations
(D) 102 constellations

Ans :

(C) 88 constellations
To standardize celestial mapping, the International Astronomical Union (IAU) officially defined 88 constellations, which together cover the entire celestial sphere, each occupying a specific region of the sky.

5. Which constellation is often represented as a hunter, with three stars in the middle forming its belt?
(A) Taurus (the Bull)
(B) Canis Major (the Great Dog)
(C) Orion (the Hunter)
(D) Ursa Minor (the Little Dipper)

Ans :

(C) Orion (the Hunter)
The constellation Orion is famously depicted as a hunter. A distinctive feature is a short line of three bright stars that represent the hunter's belt.

6. What causes light pollution in big cities, making it difficult to see many stars in the night sky?
(A) Too much natural moonlight.
(B) Excessive artificial light at night time, along with smoke and dust.
(C) The reflection of starlight from tall buildings.
(D) An increase in the number of dim stars.

Ans :

(B) Excessive artificial light at night time, along with smoke and dust.
Light pollution refers to the brightening of the night sky caused by artificial light sources (streetlights, buildings, etc.). This, combined with atmospheric smoke and dust, scatters light and reduces the visibility of fainter stars.

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7. If you want to locate the Pole Star (Polaris) using the Big Dipper, what is the general method described?
(A) Follow a line through the two stars at the end of the Big Dipper's handle.
(B) Imagine a straight line passing through the two stars at the end of the Big Dipper's cup, extending it about five times their distance.
(C) Look for the brightest star directly in the middle of the Big Dipper.
(D) The Pole Star is the middle star in the handle of the Big Dipper.

Ans :

(B) Imagine a straight line passing through the two stars at the end of the Big Dipper's cup, extending it about five times their distance.
The two stars forming the outer edge of the Big Dipper's cup are often called pointer stars. Extending an imaginary line through them northwards leads to the Pole Star.

8. What is a key difference between the Sun and other stars as they appear from Earth?
(A) The Sun emits light, while other stars only reflect light.
(B) The Sun appears much bigger and brighter because it is the star closest to us.
(C) Other stars are always hotter than the Sun.
(D) The Sun is a planet, while other stars are gaseous bodies.

Ans :

(B) The Sun appears much bigger and brighter because it is the star closest to us.
The Sun is a star, just like the distant stars we see at night. Its apparent size and brightness are due to its relative proximity to Earth compared to other stars, which are vastly farther away.

9. What is the Sun?
(A) A very large planet reflecting light.
(B) A constellation of many small stars.
(C) A star, an extremely hot spherical ball of gases that produces its own light and heat.
(D) A large moon orbiting the Earth.

Ans :

(C) A star, an extremely hot spherical ball of gases that produces its own light and heat.
The Sun is classified as a star. It is a massive, luminous sphere of hot gases (primarily hydrogen and helium) that generates its own energy through nuclear fusion.

The primary function of the telescope in this context is:

(A) To change the color of the celestial objects.

(B) To make distant objects appear brighter, larger, and more detailed.

(C) To measure the temperature of the stars.

(D) To listen to sounds from space.

Ans :

(B) To make distant objects appear brighter, larger, and more detailed.

Telescopes are optical instruments designed to collect more light than the human eye and magnify the image of distant objects, allowing for the observation of fainter objects and finer details.

24. What is the name of India's first mission to the Moon, launched in 2008?

(A) Mangalyaan

(B) Chandrayaan-1

(C) Gaganyaan

(D) Aditya-L1

Ans :

(B) Chandrayaan-1

India's first mission to the Moon, Chandrayaan-1, was launched in 2008 to study the Moon.

25. What are asteroids?

(A) Large gaseous planets found in the outer Solar System.

(B) Small, rocky, and irregularly shaped objects that revolve around the Sun, many found between Mars and Jupiter.

(C) Objects with long tails made of dust, gases, rocks, and ice that orbit the Sun.

(D) Natural satellites that orbit planets like Earth and Mars.

Ans :

(B) Small, rocky, and irregularly shaped objects that revolve around the Sun, many found between Mars and Jupiter.

Asteroids are minor planets, primarily found in the asteroid belt between Mars and Jupiter. They are smaller than planets, often irregularly shaped, and composed mainly of rock and metal.

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26. Why does a comet develop a tail as it approaches the Sun?

(A) The Sun's gravity pulls material off the comet.

(B) The frozen material (ice) in the comet starts evaporating due to the Sun's heat, forming the tail.

(C) The comet starts spinning rapidly, flinging off dust and gas.

(D) The comet collides with smaller asteroids, creating a debris trail.

Ans :

(B) The frozen material (ice) in the comet starts evaporating due to the Sun's heat, forming the tail.

Comets are icy bodies. As they near the Sun, solar radiation heats them, causing the ices to vaporize (sublimate) and release gas and dust. This material is then pushed away by solar wind and radiation pressure, forming the characteristic tail.

27. Which famous comet appears approximately every 76 years?

(A) Comet Hale-Bopp

(B) Halley's Comet

(C) Comet ISON

(D) Comet Shoemaker-Levy 9

Ans :

(B) Halley's Comet

Halley's Comet as a famous example, noting its periodic appearance roughly every 76 years.

28. What is the Milky Way Galaxy?

(A) The collection of all planets in our Solar System.

(B) A large cloud of gas and dust where new stars are formed.

(C) Our home galaxy, a vast system containing millions to billions of stars, including our Solar System.

(D) A particularly bright constellation visible throughout the year.

Ans :

(C) Our home galaxy, a vast system containing millions to billions of stars, including our Solar System.

The Milky Way Galaxy is the barred spiral galaxy that contains our Solar System. It appears as a faint band of light across the night sky and is composed of countless stars, gas, and dust.

29. What is the primary difference between how planets and stars produce light (as seen from Earth)?
(A) Planets produce their own light; stars reflect sunlight.
(B) Stars produce their own light; planets primarily shine by reflecting sunlight.
(C) Both planets and stars produce their own light equally.
(D) Neither planets nor stars produce light; they reflect light from the Moon.

Ans :

(B) Stars produce their own light; planets primarily shine by reflecting sunlight.
Stars are self-luminous bodies that generate light through nuclear fusion. Planets do not produce their own significant light; they are visible because they reflect the light from their parent star (in our case, the Sun).

30. Which of these is NOT a primary reason why the night sky in Nubra, Ladakh is very clearly visible?
(A) Almost cloudless weather.
(B) Almost no air pollution.
(C) Almost no light pollution.
(D) The presence of many artificial lights for better viewing.

Ans :

(D) The presence of many artificial lights for better viewing.
The clear visibility of the night sky in Nubra is attributed to its clear weather, and lack of air and light pollution. Artificial lights would cause light pollution, hindering night sky observation.

31. **Assertion (A) :** The Pole Star appears stationary in the North direction in the Northern Hemisphere.
Reason (R) : The Pole Star is located very close to the Earth's axis of rotation when extended into space.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(A) Both A and R are true, and R is the correct explanation of A.
The Pole Star (Polaris) appears nearly stationary because it lies almost directly above the Earth's North Celestial Pole, the point around which the northern sky appears to rotate due to Earth's rotation.

32. Which of the following celestial bodies revolve around the Sun?
1. Planets
2. Asteroids
3. Comets
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(D) 1, 2, and 3
Planets, asteroids, and comets are all members of the Solar System that orbit (revolve around) the Sun, each following its own path or orbit.

33. To get the best view of a faint constellation, what kind of night and location should an observer choose?
(A) A moonlit night in the middle of a brightly lit city.
(B) A cloudy night in a rural area.
(C) A clear, moonless night in an open area away from city lights.
(D) A clear night, but only during twilight hours.

Ans :

(C) A clear, moonless night in an open area away from city lights.
For optimal night sky viewing, especially for faint objects, conditions should minimize interference. This means a clear sky (no clouds), no bright moonlight, and a location with minimal light pollution (away from city lights).

34. The Indian term nakshatra is used in astronomy to denote:
(A) Only planets visible to the naked eye.
(B) Either a certain star or a group of stars (like Ardra or Krittika).
(C) The path of the Sun across the sky.
(D) Only the phases of the Moon.

Ans :

(B) Either a certain star or a group of stars (like Ardra or Krittika).
The More to know! box explains that in Indian astronomy, nakshatra refers to specific stars or asterisms (small groups of stars), such as Ardra (Betelgeuse) and Krittika (Pleiades).

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35. Why is it important to wait for about half an hour for eyes to get adjusted to darkness before night sky watching?
(A) To allow the stars to become brighter.
(B) To allow the pupils of the eyes to dilate, increasing sensitivity to faint light.
(C) To give time for clouds to clear away.
(D) To allow the telescope to cool down to the ambient temperature.

Ans :

(B) To allow the pupils of the eyes to dilate, increasing sensitivity to faint light.
When moving from a bright to a dark environment, the pupils of the eyes enlarge (dilate) to let in more light. This process, called dark adaptation, takes time and significantly improves the ability to see faint objects like stars.

36. What is the movement of an object, like a planet, around another much larger object, like the Sun, called?
(A) Rotation
(B) Revolution
(C) Constellation
(D) Galaxy

Ans :

(B) Revolution
Revolution refers to the orbital motion of one celestial body around another. For example, planets revolve around the Sun, and moons revolve around planets.

37. Which of these is Earth's natural satellite?
(A) Mars
(B) The Sun
(C) The Moon
(D) Sirius

Ans :

(C) The Moon
The Moon is the only natural satellite that orbits the Earth. It is our closest celestial neighbor.

38. What is a key difference between the surface of Earth and the surface of the Moon regarding atmosphere and life?
(A) Earth has a thick atmosphere and abundant life; the Moon has hardly any atmosphere and no known life.
(B) Both have thick atmospheres, but only Earth has life.
(C) The Moon has a denser atmosphere than Earth, supporting simple life forms.
(D) Neither Earth nor the Moon has a significant atmosphere or life.

Ans :

(A) Earth has a thick atmosphere and abundant life; the Moon has hardly any atmosphere and no known life.
Earth possesses a substantial atmosphere and harbors a vast diversity of life. The Moon, in contrast, has a very tenuous exosphere (hardly any atmosphere) and no evidence of indigenous life.

39. Which of these planets is NOT one of the inner four planets (Mercury, Venus, Earth, Mars)?
(A) Venus
(B) Earth
(C) Jupiter
(D) Mars

Ans :

(C) Jupiter
The inner four planets are Mercury, Venus, Earth, and Mars. Jupiter is the first of the outer planets, a gas giant located beyond the asteroid belt.

40. If astronomers discover a new celestial body orbiting a star other than our Sun, what would this newly discovered body be called?
(A) A moon of our Solar System.
(B) An asteroid within our Solar System.
(C) An explanted.
(D) A new constellation.

Ans :

(C) An explanted.
Planets that orbit stars outside of our own Solar System are termed explants or extra solar planets. The search for explants is a major area of modern astronomical research.

41. In which Indian region, known for its clear skies and low pollution, do Yangdol and Dorjay live?
(A) The Sunder bans, West Bengal
(B) The Rann of Kutch, Gujarat
(C) Nubra, Ladakh
(D) The Western Ghats, Kerala

Ans :

(C) Nubra, Ladakh
The Yangdol and Dorjay as residents of a village in Nubra, Ladakh, a region praised for its majestic mountains and exceptionally clear night skies ideal for stargazing.

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The Vikram lander of the Chandrayaan-3 mission successfully soft-landed on the Moon on August 23, 2023, and this date has been declared National Space Day in India.

55. How does the Earth (Blue Planet) primarily get its blue appearance when viewed from space?
(A) Due to its blue-colored rocks and soil.
(B) Due to a large portion of its surface being covered with water.
(C) Due to the reflection of blue light from its atmosphere.
(D) Due to the presence of blue vegetation.

Ans :

(B) Due to a large portion of its surface being covered with water.
The Earth is often called the Blue Planet because oceans and other water bodies cover a significant majority of its surface, giving it a predominantly blue appearance from space.

56. Which of these is NOT a condition mentioned as ideal for night sky watching?
(A) A clear, cloudless night.
(B) A location in a brightly lit city center.
(C) An open area away from tall buildings and trees.
(D) A moonless night, especially for faint objects.

Ans :

(B) A location in a brightly lit city center.
Bright city lights cause light pollution, which obscures the view of fainter celestial objects. Ideal night sky watching requires dark locations away from such artificial lighting.

57. A student is using a sky mapping app on their phone to identify constellations. The app shows a pattern of stars resembling a large ladle or plough in the northern sky. This is most likely the constellation commonly known as:
(A) Orion
(B) Canis Major
(C) The Big Dipper (part of Ursa Major)
(D) Taurus

Ans :

(C) The Big Dipper (part of Ursa Major)
The Big Dipper is a well-known asterism (star pattern) within the constellation Ursa Major, easily recognizable by its shape resembling a ladle or plough, and it is prominent in the northern sky.

58. **Assertion (A) :** Planets shine by reflecting sunlight.
Reason (R) : Planets, like stars, generate their own light through nuclear fusion.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(C) A is true, but R is false.
Planets are visible because they reflect light from the Sun (or their host star). They do not generate their own light through nuclear fusion; that process is characteristic of stars.

59. Which of these are true regarding the Moon?
1. It is Earth's only natural satellite.
2. It has a thick atmosphere similar to Earth's.
3. Its surface has craters formed by impacts.
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(C) 1 and 3 only
The Moon is Earth's sole natural satellite and its surface is heavily catered due to impacts. It has hardly any atmosphere, unlike Earth's thick atmosphere.

60. An ancient caravan leader, traveling through the Nubra region at night without a compass, needs to determine the north direction.
Which celestial object or pattern would be most reliable for finding the North direction?
(A) The brightest star visible, Sirius.
(B) The constellation Orion.
(C) The Pole Star (Polaris/Dhruva tara).
(D) The planet Venus when visible as the Morning Star.

Ans :

(C) The Pole Star (Polaris/Dhruva tara).
The Pole Star is renowned for its fixed position in the northern sky (in the Northern Hemisphere), making it an excellent and reliable indicator of the North direction for navigation.

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(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Ans :

(C) A is true, but R is false.
The Sun does appear much larger and brighter to us than other stars. However, this is because it is the closest star to Earth. There are many other stars in the universe that are much larger and hotter than our Sun.

49. What are the characteristics of the Sun?
1. It is a star.
2. It is an extremely hot spherical ball of gases.
3. It revolves around the Earth.

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2, and 3

Ans :

(A) 1 and 2 only
The Sun is indeed a star and is composed of extremely hot gases. However, the Earth revolves around the Sun, not the other way around.

50. Yangdol and Dorjay are observing the night sky. They notice a celestial object with a long, glowing tail that slowly moves across the sky over several nights.
This object is most likely a:
(A) Planet like Venus
(B) Constellation like Orion
(C) Comet
(D) Natural satellite like the Moon

Ans :

(C) Comet
Comets are celestial bodies made of ice, dust, and rock that develop a visible tail of gas and dust when they approach the Sun. Their appearance in the sky is often temporary as they follow their orbits.

51. What is the approximate distance of the Moon from the Earth?
(A) 150 million km
(B) 3,84,000 km
(C) 1.5 million km
(D) 269,000 au

Ans :

(B) 3,84,000 km
The Moon is about 3,84,000 kilometres away from the Earth, making it our closest natural celestial neighbour.

52. Why does the Pole Star (Dhruva tara) appear stationary in the sky from the Northern Hemisphere?
(A) Because it is the brightest star and does not move.
(B) Because it is located very close to the Earth's axis of rotation extended into the northern sky.
(C) Because it is much closer to Earth than any other star.
(D) Because it is part of a constellation that does not appear to move.

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Ans :

(B) Because it is located very close to the Earth's axis of rotation extended into the northern sky.
The Pole Star's apparent fixed position is due to its alignment almost directly above the Earth's North Celestial Pole. As the Earth rotates, this star appears to remain stationary while other stars seem to circle around it.

53. What is the term used in Indian astronomy for either a certain star or a group of stars, such as Ardra or Krittika?
(A) Rashi
(B) Graha
(C) Nakshatra
(D) Dhumaketu

Ans :

(C) Nakshatra
Nakshatra is an Indian astronomical term referring to specific stars or asterisms (star groups), like Ardra (Betelgeuse) or Krittika (Pleiades).

54. The successful soft-landing of Chandrayaan-3's Vikram lander on the Moon occurred on which date, now celebrated as National Space Day in India?
(A) July 14, 2023
(B) August 23, 2023
(C) October 22, 2008
(D) September 7, 2019

Ans :

(B) August 23, 2023

42. Why do stars, which are massive celestial bodies, appear as tiny points of light from Earth?
(A) Because they are actually very small in size.
(B) Because Earth's atmosphere filters out most of their light.
(C) Because they are extremely far away from Earth.
(D) Because they emit very little light compared to the Sun.

Ans :

(C) Because they are extremely far away from Earth.
The vast interstellar distances make even enormous stars appear as small points of light when viewed from Earth. Their apparent smallness is due to their immense distance, not their actual size.

43. What is the term for the Earth's movement around the Sun?
(A) Rotation
(B) Revolution
(C) Constellation
(D) Libration

Ans :

(B) Revolution
Revolution refers to the orbital motion of one celestial body around another. The Earth revolves around the Sun, completing one orbit in approximately one year.

44. Which planet is commonly called the Morning Star or Evening Star because it shines brightly at dawn or dusk?
(A) Mars
(B) Jupiter
(C) Venus
(D) Mercury

Ans :

(C) Venus
Venus is often the brightest planet visible in the sky and can be seen shining brilliantly in the east before sunrise (Morning Star) or in the west after sunset (Evening Star).

45. What is a significant visual difference between the inner four planets (e.g., Earth, Mars) and the outer four planets (e.g., Jupiter, Saturn) regarding their structure?
(A) Inner planets are gaseous; outer planets are rocky.
(B) Inner planets have solid, rocky surfaces; outer planets are mostly gaseous and much larger.
(C) Inner planets all have prominent rings; outer planets do not.
(D) Inner planets are much farther from the Sun than outer planets.

Ans :

(B) Inner planets have solid, rocky surfaces; outer planets are much larger and mostly gaseous.
The inner planets (Mercury, Venus, Earth, Mars) are terrestrial, meaning they have solid, rocky surfaces. The outer planets (Jupiter, Saturn, Uranus, Neptune) are gas giants or ice giants, lacking solid surfaces and being considerably larger.

46. Which of the following is NOT a characteristic of asteroids as described?
(A) They are small objects in the Solar System.
(B) They are rocky and irregular in shape.
(C) They all have long, visible tails made of gas and dust.
(D) Many revolve around the Sun in a belt between Mars and Jupiter.

Ans :

(C) They all have long, visible tails made of gas and dust.
Asteroids are primarily rocky and metallic bodies. Long tails of gas and dust are characteristic of comets when they approach the Sun, not asteroids.

47. If you were trying to identify the constellation Orion in the night sky during winter in India, what distinctive feature would you look for first?
(A) A very bright single star isolated from others.
(B) A group of seven stars forming a dipper shape.
(C) Three bright stars in a short, straight line (Orion's belt).
(D) A faint, hazy patch of light stretching across the sky.

Ans :

(C) Three bright stars in a short, straight line (Orion's belt).
The easiest way to find Orion is to first identify the three bright stars in a row that form its belt, a very recognizable asterism within the constellation.

48. **Assertion (A) :** The Sun appears much larger and brighter than other stars.
Reason (R) : The Sun is the largest and hottest star in the entire universe.

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MATCHING TYPE QUESTION

61. Match the Earth material in Column A with its common use or characteristic in Column B:

	Column A		Column B
1.	Soil	A.	Used for roofing (e.g., slate) or building (laterite)
2.	Rocks	B.	Extracted from rocks, used in electronics (e.g., gold, copper)
3.	Minerals	C.	Windmills are used to generate electricity from it
4.	Wind	D.	Formed from rock disintegration; supports plant life

(a) 1-D, 2-A, 3-B, 4-C
(b) 1-A, 2-D, 3-C, 4-B
(c) 1-D, 2-C, 3-A, 4-B
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(a) 1-D, 2-A, 3-B, 4-C
Soil supports plant life. Rocks like slate are used in construction. Minerals are extracted from rocks for various uses. Wind energy can generate electricity using windmills.

62. Match the term related to natural resources in Column A with its correct association in Column B:

	Column A		Column B
1.	Van Mahotsav	A.	Measure to reduce water wastage
2.	Saline Water	B.	Example of a windmill farm in India
3.	Muppandal Wind Farm	C.	Tree plantation festival for forest conservation
4.	Turning off taps when not in use	D.	Found in oceans and seas, not fit for direct human use

(a) 1-B, 2-D, 3-A, 4-C
(b) 1-C, 2-A, 3-D, 4-B
(c) 1-D, 2-A, 3-B, 4-C
(d) 1-C, 2-D, 3-B, 4-A

Ans :

(d) 1-C, 2-D, 3-B, 4-A
Van Mahotsav is a tree plantation festival. Saline water is salty sea/ocean water. Muppandal is a known windmill farm. Turning off taps conserves water.

63. Match the celestial body in Column A with its defining characteristic in Column B:

	Column A		Column B
1.	Star	A.	Orbits a planet
2.	Planet	B.	Emits its own light and heat
3.	Moon	C.	A small, rocky object orbiting the Sun, mainly between Mars and Jupiter
4.	Asteroid	D.	Orbits a star, is nearly spherical, and large

(a) 1-B, 2-D, 3-A, 4-C
(b) 1-D, 2-B, 3-C, 4-A
(c) 1-B, 2-A, 3-D, 4-C
(d) 1-C, 2-D, 3-A, 4-B

Ans :

(a) 1-B, 2-D, 3-A, 4-C
Stars emit their own light. Planets orbit stars. Moons are natural satellites orbiting planets. Asteroids are small rocky bodies orbiting the Sun, many in the asteroid belt.

64. Match the astronomical term in Column A with its correct description in Column B:

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	Column A		Column B
1.	Constellation	A.	The galaxy that contains our Solar System
2.	Solar System	B.	A celestial body made of ice, dust, and rock that develops a tail near the Sun
3.	Milky Way Galaxy	C.	A group of stars forming a recognizable pattern in the sky
4.	Comet	D.	The Sun and all celestial bodies orbiting it

(a) 1-A, 2-D, 3-C, 4-B
(b) 1-C, 2-B, 3-D, 4-A
(c) 1-D, 2-C, 3-A, 4-B
(d) 1-C, 2-D, 3-A, 4-B

Recognizing star patterns helped people, particularly sailors and travellers, in finding directions at sea or on land for navigation.

89. What is a constellation according to current definitions by the International Astronomical Union (IAU)?

Ans :

Currently, constellations are defined as regions of the sky, which include groups of stars that often form prominent patterns.

90. Name the constellation often represented as a hunter and mention the feature representing his belt.

Ans :

The constellation Orion is often represented as a hunter. Three bright stars in a short straight line in the middle represent the hunter's belt.

91. What is the significance of the Pole Star for navigation in the Northern Hemisphere?

Ans :

The Pole Star appears stationary in the North direction, which consistently helps in locating the North direction, aiding navigation.

92. Why might fewer stars be visible in a big city compared to a village on a clear night?

Ans :

Fewer stars are visible in big cities due to light pollution, smoke, and dust, which obscure the night sky.

93. What is the Sun, and why does it glow so brightly?

Ans :

The Sun is a star, an extremely hot spherical ball of gases. It glows brightly because it gives out a huge amount of energy.

94. Why does the Sun appear much bigger and brighter to us than other stars?

Ans :

The Sun appears much bigger and brighter because it is the star closest to us. Other stars are much farther away.

95. What is a planet? Name the four inner planets of our Solar System.

Ans :

A planet is a large, nearly spherical object that revolves around the Sun. The four inner planets are Mercury, Venus, Earth, and Mars.

96. Why is Venus often called the Morning Star or Evening Star?

Ans :

Venus is called the Morning Star or Evening Star because it usually shines brightly at dawn (morning) or dusk (evening).

97. Why is Earth referred to as the Blue Planet?

Ans :

Earth is called the Blue Planet because a large portion of its surface is covered with water, making it appear blue from space.

98. What are the general characteristics of the four outermost planets of our Solar System?

Ans :

The four outermost planets (Jupiter, Saturn, Uranus, Neptune) are much larger than Earth, are mostly made of gases, and have rings around them.

99. Why is Venus hotter than Mercury, even though Mercury is closer to the Sun?

Ans :

Venus is hotter than Mercury because its dense atmosphere traps a significant amount of heat, leading to a strong greenhouse effect.

100. What is a natural satellite? Give an example from our Solar System.

Ans :

A natural satellite is an object that moves around a planet. Earth's Moon is an example of a natural satellite.

101. Briefly describe the surface of the Moon and what causes its cratered appearance.

Ans :

The Moon's surface is rocky and shows circular bowl-like structures called craters. Most craters formed due to the impact of asteroids or rocks from space.

102. What is an asteroid belt, and where is it located in our Solar System?

Ans :

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Ans :

These patterns are called constellations.

71. How many constellations were officially listed by the International Astronomical Union (IAU)?

Ans :

88 constellations were officially listed.

72. Which star is the brightest in the night sky and is part of the Canis Major constellation?

Ans :

Sirius is the brightest star in the night sky.

73. What is the Indian name for the Big Dipper constellation?

Ans :

The Big Dipper is known as Saptarishi in India.

74. Which star appears stationary in the North direction in the Northern hemisphere?

Ans :

The Pole Star (Polaris or Dhruva tara).

75. What is the presence of excessive artificial light at night time referred to as?

Ans :

It is referred to as light pollution.

76. Is the Pole Star visible from the southern hemisphere of Earth?

Ans :

No, the Pole Star is not visible from the southern hemisphere.

77. What is the Sun primarily composed of?

Ans :

The Sun is an extremely hot spherical ball of gases.

78. What is the approximate distance between the Sun and the Earth called?

Ans :

It is called an astronomical unit (au).

79. What is the movement of an object around the Sun called?

Ans :

The movement of an object around the Sun is called revolution.

80. Name the planet closest to the Sun.

Ans :

Mercury is the planet closest to the Sun.

81. Which planet is commonly called the Red Planet?

Ans :

Mars is commonly called the Red Planet.

82. What are the large, flat ring-like structures around planets like Saturn made of?

Ans :

They are made of dust particles and rocky material.

83. What are natural satellites of planets commonly called?

Ans :

Natural satellites of planets are commonly called moons.

84. How many moons does Earth have?

Ans :

Earth has one Moon.

85. What are the bowl-like structures on the Moon's surface called?

Ans :

These structures are called craters.

86. What is the name of India's home galaxy?

Ans :

India's home galaxy is called the Milky Way Galaxy (or Akasha Ganga).

87. What are planets discovered revolving around other stars in our galaxy called?

Ans :

They are called exoplanets.

SHORT ANSWER QUESTION

88. How did recognizing star patterns help people in olden times before modern technology?

Ans :

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Ans :

(d) 1-C, 2-D, 3-A, 4-B
A constellation is a star pattern. The Solar System includes the Sun and its orbiting bodies. The Milky Way is our galaxy. Comets develop tails near the Sun.

65. Match the specific celestial body or feature in Column A with its notable characteristic in Column B:

	Column A		Column B
1.	Sun	A.	Earth's natural satellite with craters
2.	Earth	B.	Appears stationary in the northern sky, indicates North
3.	Moon	C.	The star closest to Earth, providing heat and light
4.	Pole Star (Dhruva tara)	D.	Known as the Blue Planet due to water

(a) 1-C, 2-D, 3-A, 4-B
(b) 1-D, 2-C, 3-B, 4-A
(c) 1-C, 2-A, 3-D, 4-B
(d) 1-B, 2-D, 3-A, 4-C

Ans :

(a) 1-C, 2-D, 3-A, 4-B
The Sun is our closest star. Earth is called the Blue Planet. The Moon is Earth's satellite with craters. The Pole Star helps find the North direction.

66. Match the planet in Column A with a distinguishing feature or nickname mentioned in Column B:

	Column A		Column B
1.	Mercury	A.	Known as the Morning Star or Evening Star
2.	Venus	B.	Largest planet in the Solar System with many moons
3.	Mars	C.	Innermost and smallest of the eight planets
4.	Jupiter	D.	Called the Red Planet due to its reddish soil

(a) 1-A, 2-C, 3-D, 4-B
(b) 1-C, 2-D, 3-A, 4-B
(c) 1-D, 2-A, 3-B, 4-C
(d) 1-C, 2-A, 3-D, 4-B

Ans :

(d) 1-C, 2-A, 3-D, 4-B
Mercury is the innermost planet. Venus is often seen as the Morning/Evening Star. Mars is the Red Planet. Jupiter is the largest planet.

67. Match the Indian astronomical term or mission in Column A with its Western counterpart or description in Column B:

	Column A		Column B
1.	Saptarishi	A.	India's successful Moon mission series
2.	Ardra	B.	The Big Dipper constellation
3.	Rohini	C.	The star Betelgeuse in Orion constellation
4.	Chandrayaan	D.	The star Aldebaran in Taurus constellation

(a) 1-C, 2-B, 3-D, 4-A
(b) 1-B, 2-D, 3-C, 4-A
(c) 1-B, 2-C, 3-D, 4-A
(d) 1-D, 2-A, 3-B, 4-C

Ans :

(c) 1-B, 2-C, 3-D, 4-A
Saptarishi is the Indian name for the Big Dipper. Ardra corresponds to Betelgeuse. Rohini corresponds to Aldebaran. Chandrayaan refers to India's lunar missions.

VERY SHORT QUESTION

68. What did ancient caravans passing through Nubra use to find direction?

Ans :

They used particular stars in the clear skies.

69. Do stars shine with their own light or reflected light?

Ans :

Stars shine with their own light.

70. What are groups of stars that appear to form patterns called?

An asteroid belt is a region where many small, rocky, and irregular-shaped objects called asteroids revolve around the Sun. It is located mainly between Mars and Jupiter.

103. What are comets made of, and what causes them to develop a tail?

Ans :

Comets are made of dust, gases, rocks, and ice. As a comet approaches the Sun, its frozen material starts evaporating, forming the tail.

104. What objects make up our Solar System?

Ans :

Our Solar System consists of the Sun, eight planets, their moons, and many smaller objects including asteroids and comets.

105. What is the Milky Way Galaxy? What is our Solar System's relation to it?

Ans :

The Milky Way Galaxy (Akasha Ganga) is a vast collection of millions to billions of stars. Our Solar System is a part of this galaxy.

106. Why is it generally difficult to see other stars during the daytime?

Ans :

During the daytime, the extreme brightness of the Sun, which is much closer to us, overwhelms the faint light from distant stars, making them invisible.

107. What was the significance of India's Chandrayaan-3 mission?

Ans :

Chandrayaan-3's Vikram lander successfully soft-landed near the Moon's south pole, making India the first country to achieve this feat.

LONG ANSWER QUESTION

108. Explain how constellations were useful to ancient civilizations and how they are defined today. Give an example of a constellation and a prominent star within or near it.

Ans :

Ancient civilizations used recognizable star patterns (constellations) for navigation, helping sailors and travellers find directions. Today, the IAU defines 88 constellations as specific regions of the sky, which include these traditional patterns. For example, the constellation Canis Major contains Sirius, the brightest star in the night sky.

109. What is light pollution? How does it affect our ability to observe the night sky, and what measures are being taken to preserve dark skies?

Ans :

Light pollution is the presence of excessive artificial light at night. It brightens the night sky, reducing the visibility of fainter stars and celestial objects. To preserve dark skies for enjoyment and research, some dark sky reserves and parks have been established where light pollution is controlled.

110. Describe the Sun's characteristics and its importance to Earth. Why does it appear different from other stars?

Ans :

The Sun is our closest star, a massive, extremely hot sphere of gases producing immense heat and light. It's crucial for Earth as the main energy source, supporting life, driving climate, seasons, and the water cycle. It appears larger and brighter than other stars simply because it is much closer to us.

111. List the eight planets of our Solar System in order from the Sun. Briefly differentiate between the inner and outer planets in terms of their general composition and size.

Ans :

Planets in order: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. The inner four (Mercury to Mars) are smaller, rocky, and have solid surfaces. The outer four (Jupiter to Neptune) are much larger gas giants, primarily composed of gases and liquids, and often have rings.

112. What are moons (natural satellites)? Describe key features of Earth's Moon, including its distance, revolution period, and surface characteristics.

Ans :

Moons are natural satellites that revolve around planets. Earth's Moon is about 384,000 km away and takes roughly 27 days to orbit Earth. Its

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surface is rocky, lacks a significant atmosphere, and is heavily cratered due to impacts from space objects over billions of years.

113. What are asteroids and comets? Describe their composition and typical locations or movements within the Solar System.

Ans :

Asteroids are small, rocky, irregularly shaped objects, many of which orbit the Sun in the asteroid belt between Mars and Jupiter. Comets are composed of dust, gases, rocks, and ice. They typically originate from the outer Solar System and develop long tails as they approach the Sun due to evaporating materials.

114. Explain how to locate the Pole Star using the Big Dipper constellation. Why is the Pole Star significant for navigation?

Ans :

To find the Pole Star using the Big Dipper, locate the two stars at the end of the Big Dipper's cup. Imagine a straight line extending upwards from these two stars. The Pole Star is found along this line, at about five times the distance between these two pointer stars. It's significant because it's almost directly above Earth's North Pole and appears stationary, providing a reliable indicator of North.

115. What is a galaxy? Describe our home galaxy, the Milky Way, and its appearance in a dark night sky.

Ans :

A galaxy is a vast system containing millions to billions of stars, along with gas, dust, and dark matter, all held together by gravity. Our home galaxy is the Milky Way (Akasha Ganga). From a dark location, it appears as an extended, faint, glowing band of light stretching across the sky.

116. What are some challenges and preparations involved in night sky watching? Mention at least three preparations for a good viewing experience.

Ans :

Challenges include light pollution, weather (clouds), and obstructions like buildings. Preparations: 1. Choose a dark, open location away from city lights. 2. Pick a clear, moonless night for better visibility of fainter objects. 3. Allow your eyes about 30 minutes to adjust to the darkness to see more stars.

117. Briefly discuss India's Chandrayaan missions. What was a major achievement of Chandrayaan-3, and what is the aim of Chandrayaan-4?

Ans :

India has launched missions to study the Moon: Chandrayaan-1 (2008), Chandrayaan-2 (2019), and Chandrayaan-3 (2023). Chandrayaan-3 achieved a historic soft landing near the Moon's little-explored south pole. The upcoming Chandrayaan-4 mission aims to bring back soil and rock samples from the Moon for further study.

CASE BASED QUESTION

118. Yangdol and Dorjay are observing the night sky from their village in Ladakh. Yangdol points to a group of seven bright stars forming a ladle shape and calls it Saptarishi. Dorjay then uses two stars in this group to find a fainter star that seems to stay in the same place.

(i) What is the common English name for the Saptarishi constellation (or asterism)?
(ii) Which star is Dorjay trying to locate using the pointer stars of the Saptarishi?
(iii) Why is this star important for someone trying to find their way at night in the Northern Hemisphere?

Ans :

(i) The common English name for Saptarishi is the Big Dipper.
(ii) Dorjay is trying to locate the Pole Star (Polaris or Dhruva tara).
(iii) This star is important because it appears almost stationary in the sky and is located very close to the North Celestial Pole, thus reliably indicating the North direction.

119. A student is looking at the sky just after sunset and sees a very bright, star-like object in the west that does not twinkle much. Her sky map app identifies it as Venus.

(i) Why might Venus be referred to as the Evening Star in this situation?
(ii) What is a key difference in appearance that helps distinguish planets like Venus from stars?

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(iii) Is Venus producing its own light like a star? Explain.

Ans :

(i) Venus is referred to as the Evening Star because it is visible and shining brightly in the western sky shortly after sunset.
(ii) Stars tend to twinkle noticeably, while planets like Venus usually shine with a steadier light.
(iii) No, Venus does not produce its own light. It shines because it reflects sunlight from its surface, much like Earth's Moon.

120. Astronomers are studying a newly discovered celestial object that orbits the Sun between Mars and Jupiter. It is rocky, irregular in shape, and much smaller than a planet.
(i) What type of celestial object is this likely to be?
(ii) What is the name of the region where many such objects are found?
(iii) If this object were primarily made of ice and dust and developed a long tail when it got closer to the Sun, what would it be called?

Ans :

(i) This object is likely to be an asteroid.
(ii) The region where many such objects are found is called the asteroid belt.
(iii) If it were made of ice and dust and developed a tail near the Sun, it would be called a comet.

121. The Indian Space Research Organisation (ISRO) successfully landed its Chandrayaan-3 mission near the Moon's south pole. The Pragyan rover explored the surface, sending back data.
(i) What is the Moon in relation to the Earth?
(ii) Why is landing near the Moon's south pole considered a significant achievement?
(iii) Does the Moon have an atmosphere similar to Earth's that could have affected the landing?

Ans :

(i) The Moon is Earth's natural satellite.
(ii) The Moon's south pole is a little-explored region, believed to contain water ice in permanently shadowed craters, making it scientifically valuable.
(iii) No, the Moon has hardly any atmosphere, which means there is no air resistance to slow down a lander; different landing techniques are required.

122. A group of students visits the Hanle Dark Sky Reserve in Ladakh. They are amazed by the clear view of a faint, milky band of light stretching across the entire sky. Their guide tells them it's their home galaxy.
(i) What is the name of this band of light, which is our home galaxy?
(ii) What are galaxies primarily composed of?
(iii) Why is a Dark Sky Reserve like Hanle particularly good for observing such celestial features?

Ans :

(i) This band of light is the Milky Way Galaxy (or Akasha Ganga).
(ii) Galaxies are primarily composed of millions to billions of stars, along with gas, dust, and dark matter.
(iii) A Dark Sky Reserve has minimal light pollution, meaning the sky is very dark, allowing faint celestial objects like the Milky Way to be seen clearly without interference from artificial lights.

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